Mining

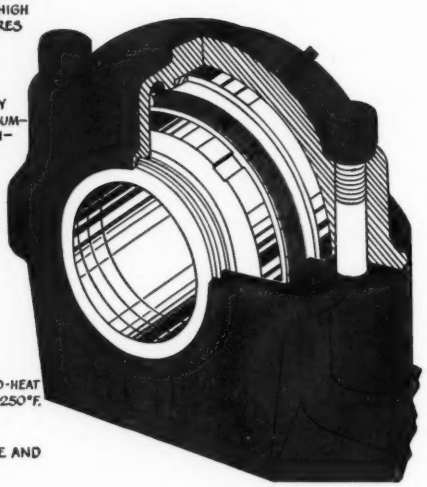
CONGRESS JOURNAL

MAY
1946

STANDARD ENGINEERS NOTEBOOK

CALOL S.A. GREASE ASSURES GOOD LUBRICATION IN HIGH AMBIENT TEMPERATURES

CALOL S.A. GREASE MAY BE USED ON LOW-, MEDIUM- AND HIGH-SPEED ANTI-FRICTION AND PLAIN BEARINGS



WITHSTANDS RADIATED-HEAT TEMPERATURES OVER 250°F.

MINIMIZES DRIPPAGE AND LEAKAGE TROUBLE

New grease lubricates in extra hot conditions

Developed especially for bearings that must operate in radiated heat, new Calol S. A. (sodium aluminum) Grease has proved satisfactory in temperatures over 250° F. It has been tested by many operators on working machines in the field. In addition, it was given a series of tests in the Navy Ball Bearing Machine, operated at 10,000 rpm, with bearing temperatures maintained at a high degree.

Calol S. A. Grease is made from a special type base and selected oils that give it high heat-resistant qualities. In use, these qualities assure minimum drippage or leakage from bearings.

Although Calol S. A. Grease is ideal in a multiplicity of services, it is specifically adapted to the lubrication of low, medium and high speed anti-friction bearings used in all types of machines.

Made in three grades, 00, 0, and 1, by Standard of California, Calol S. A. Grease is available in 35-, 108- and 420-pound containers.

Tacky oils cut gear lubrication costs

Where bearings and gears must carry an extreme pressure load for a relatively long time because of slow operation, Calol Vistac Oils are recommended.

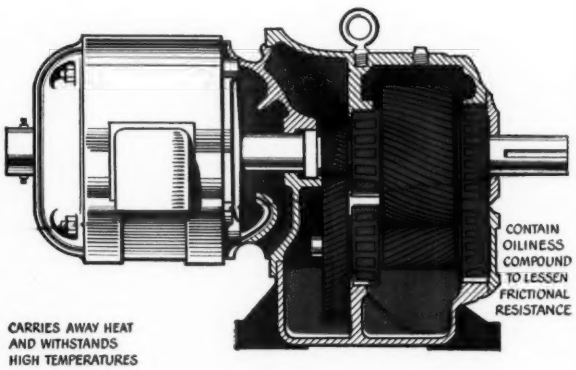
They are viscous and tacky, and have unusual ability to remain on bearing surfaces and resist film breakdown. Thus, a smaller quantity is required and many gear sets can be lubricated less expensively with Calol Vistac Oils than with ordinary oils.

A special oiliness ingredient in Calol Vistac Oils gives them low operating torque, thus minimizing frictional resistance while the extreme pressure additives used insures efficient operation under extremely heavy loads. They withstand high operating temperatures and readily carry away heat.

There are six grades of Calol Vistac Oils, providing the correct lubricant for all types of heavy-duty industrial reduction gear sets. Also excellent for the lubrication of air tools, they atomize quickly, are stable and minimize vapor trouble.

CALOL VISTAC OILS ARE VISCOUS AND TACKY AND REMAIN ON BEARING SURFACES

CALOL VISTAC OILS COME IN SIX GRADES. A SMALL QUANTITY MAINTAINS EFFICIENT LUBRICANT FILM



CONTAIN OILINESS COMPOUND TO LESSEN FRICTIONAL RESISTANCE

CARRIES AWAY HEAT AND WITHSTANDS HIGH TEMPERATURES

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Col.; Standard Oil Company of Texas, El Paso, Texas.

FOR EVERY JOB A **STANDARD OF CALIFORNIA** TEST-PROVED PRODUCT

Mining CONGRESS JOURNAL

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VOLUME 32, NUMBER 5 FOR MAY 1946

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FRONT COVER: Uravan, Colorado, where the United States Vanadium Corporation's vanadium mining operations have developed an important source of uranium.

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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309 MUNSEY BLDG., WASHINGTON 4, D. C.

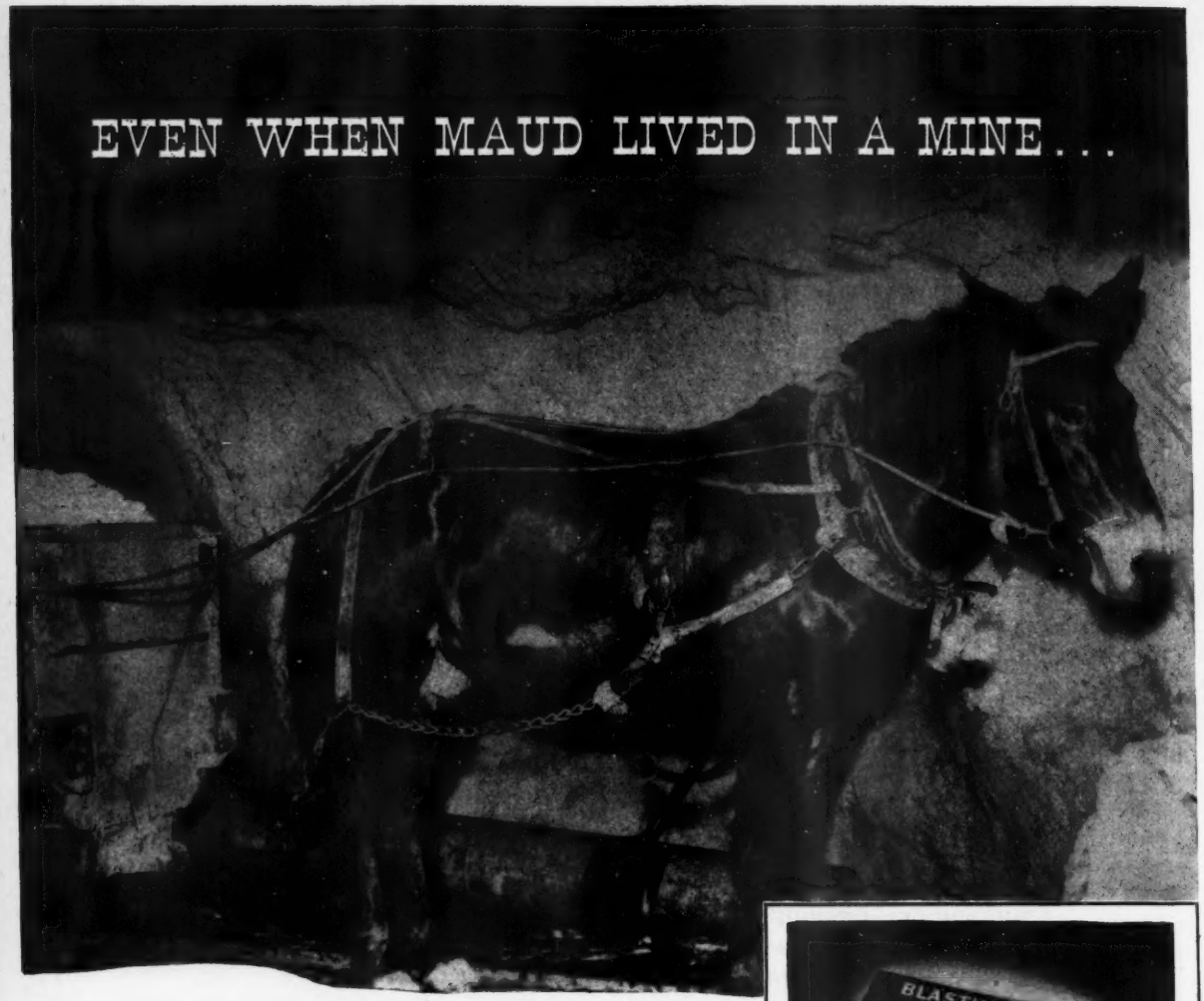
HOWARD I. YOUNG, *President* · DONALD A. CALLAHAN, *Vice President* · LOUIS S. CATES, *Vice President* · JAMES D. FRANCIS, *Vice President* · JULIAN D. CONOVER, *Secretary*

Foreign, $4.00. Single copies, $0.20. February Annual Review Issue, $0.75.
Entered as Second-Class Matter, January 30, 1915, at the Post Office at Washington, D. C.

ABC

Member, Audit Bureau of Circulations

EVEN WHEN MAUD LIVED IN A MINE...



SOME 40 YEARS AGO, when the homely, stubborn mule was the pulse of mine transportation systems . . . Du Pont Blasting Caps had already earned a well-deserved reputation for dependability.

Today, while modern mechanized hauling methods have supplanted the mule, Du Pont Blasting Caps are more dependable than ever before. They're the most widely used on the market. Well over 3 billion have been purchased. Precision-made in modern plants by the most advanced methods that research and manufacturing skill can devise, Du Pont Blasting Caps meet the requirements of blasters everywhere.

Remember . the most dependable detonator is the safest detonator. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington, Delaware.

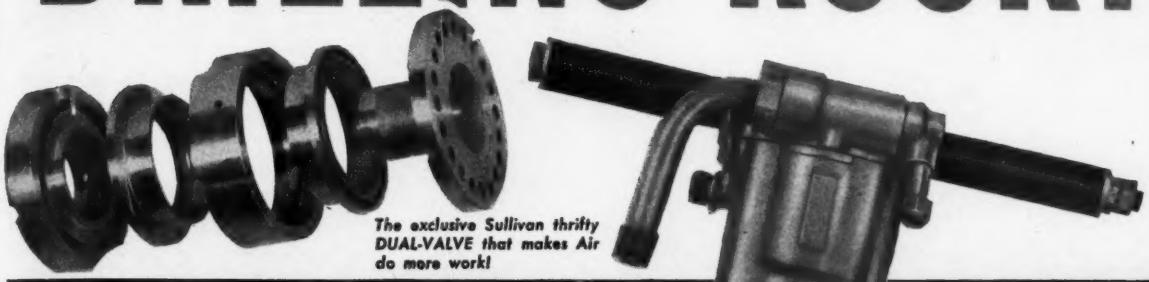
Du Pont Blasting Caps are conveniently packed in a safety box of improved design. The package protects the open ends of the caps which lie flat in the box. This reduces the possibility of accidental detonation and lessens chance of misfires resulting from wet caps. Caps are easily and quickly removed from the box.

DU PONT
REG. U. S. PAT. OFF.

DU PONT BLASTING CAPS

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DRILLING ROCK?



The exclusive Sullivan thrifty DUAL-VALVE that makes Air do more work!

SULLIVAN L-47 AIR DRILL

For taking up bottom, brushing roof and all the general utility rock jobs. Has exclusive Sullivan DUAL-VALVE for more efficient operation. 55 pound performance in a 45 pound class drill!

...look to Sullivan...

Wherever there is a rock drilling application in a coal mine, it's logical to look to Sullivan for the rock drill. Sullivan is one of the oldest and largest manufacturers of rock drills and one of the world's leading suppliers of coal mining machinery. No other manufacturer of rock drills offers the coal mine such a complete line or such a combination of background and experience. That's why it will pay you dividends to call the nearest Sullivan office for literature and information when you need rock drilling equipment.

Sullivan Division, Joy Manufacturing Company, Michigan City, Indiana. In Canada: Canadian Sullivan Machinery Company Ltd., Dundas, Ontario.

SULLIVAN L-1 DRILL

Widely used in anthracite properties for drilling both coal and rock. A 30 lb. husky that will stay on the job and do more work in less time.

SULLIVAN L-57 DRILL

For heavy, sustained rock work such as driving slopes and sinking shafts. Has the exclusive DUAL-VALVE that's thrifty because it makes the air do more work!

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SALES OFFICES IN: Birmingham - Butte - Chicago - Dallas - Denver El Paso - Huntington - Knoxville - Middlesboro - New York - Philadelphia Pittsburgh - Seattle - San Francisco - Salt Lake City - Scranton - St. Louis

SULLIVAN PRODUCTS—Coal Mining Machines - Scraper Haulers - Hoists Rock Loaders - Car Pullers - Air Compressors - Coal Drills - Rock Drills Cutter Bit Sharpeners and Heaters - Core Drills and Contract Core Drilling

Tuffy WIRE ROPES

MADE FOR MINING

MINING MACHINE ROPES*
CRAB MOTOR ROPES*
WINCH ROPES*

...and a wide scope of other special wire ropes to fit every mining requirement. Union Wire Rope's exacting engineering standards "Fit" wire ropes to the function they are to perform. Experienced wire rope craftsmen, the finest precision machinery and production techniques are employed to carry out these standards and afford the fullest measure of wire rope stamina, dependability and economy. Write for new folder on Union Mining Machine Rope.

"TUFFY MINING MACHINE ROPES" Have Clipped Ends To Afford Easy Installation

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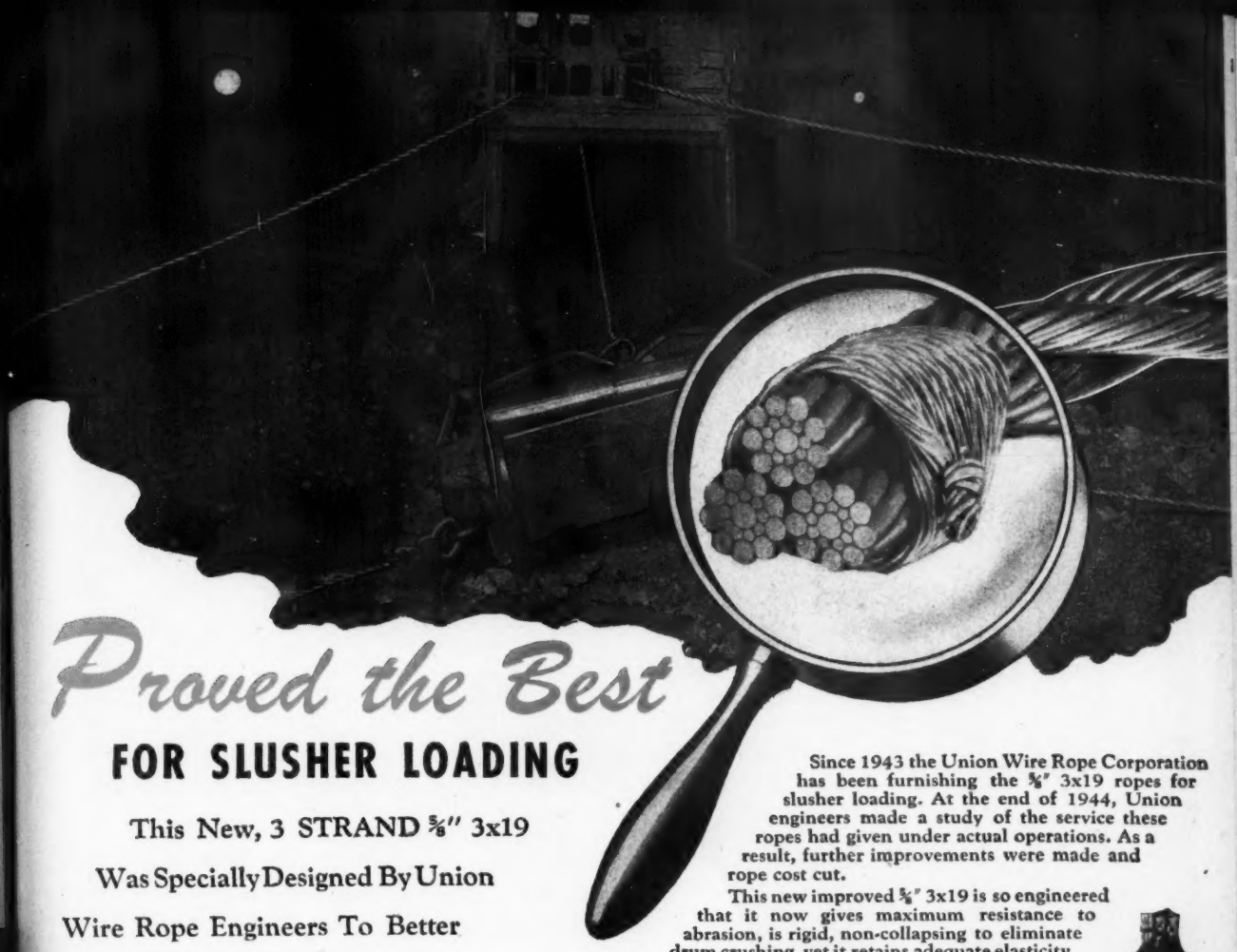


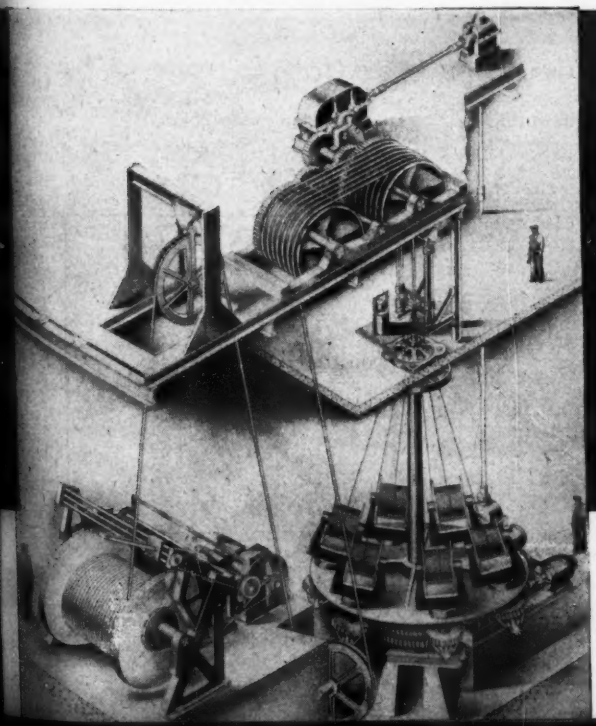
Proved the Best

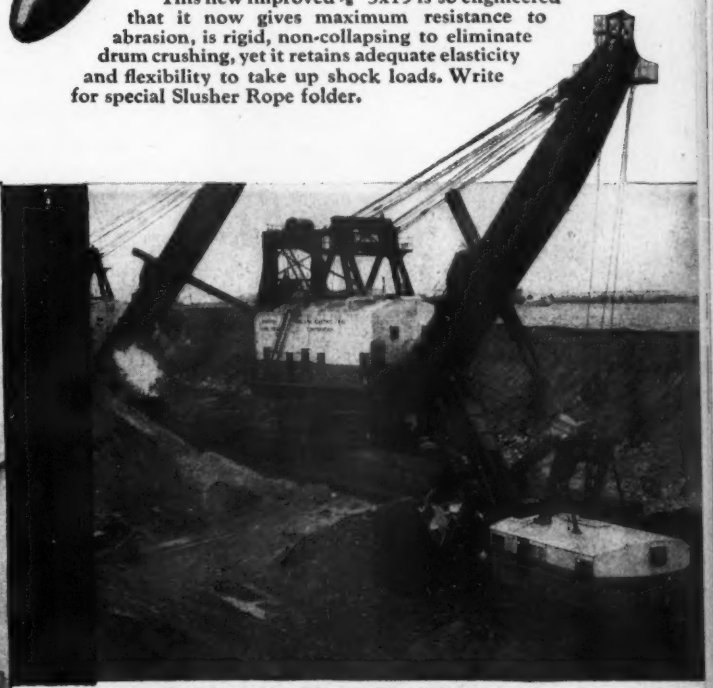
FOR SLUSHER LOADING

This New, 3 STRAND 5/8" 3x19
Was Specially Designed By Union
Wire Rope Engineers To Better
Withstand The "Rope-Killing"
Conditions of Slusher Mining.

Since 1943 the Union Wire Rope Corporation has been furnishing the 5/8" 3x19 ropes for slusher loading. At the end of 1944, Union engineers made a study of the service these ropes had given under actual operations. As a result, further improvements were made and rope cost cut.

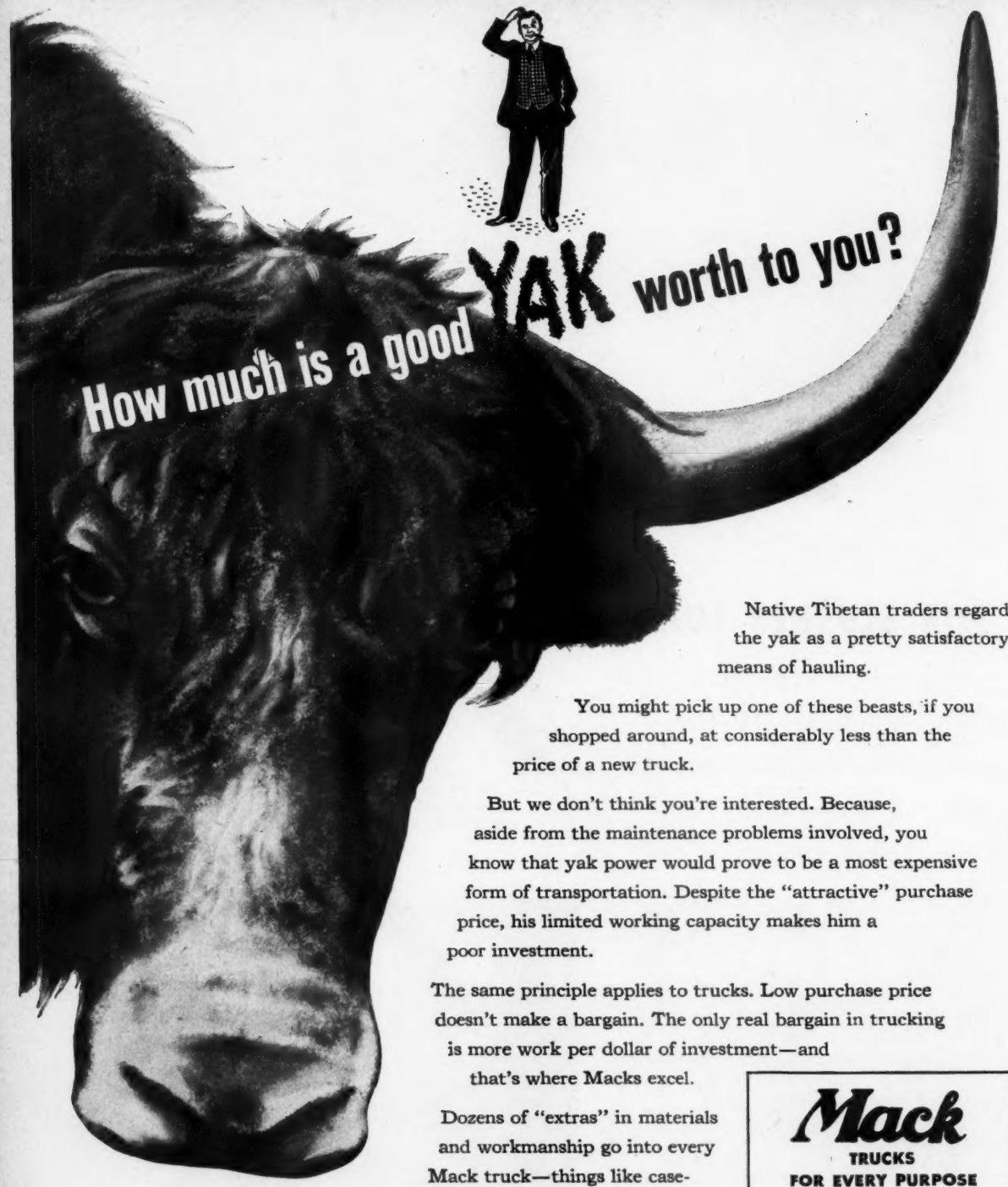
This new improved 5/8" 3x19 is so engineered that it now gives maximum resistance to abrasion, is rigid, non-collapsing to eliminate drum crushing, yet it retains adequate elasticity and flexibility to take up shock loads. Write for special Slusher Rope folder.





Illustrated at the left is Union Wire Rope's giant 4-story closing m
chine, capable of producing 27 tons of wire rope in one continuo
length. It has a range of 3/4" to 4" diameter to fulfill many wire ro
needs such as those of the mammoth strip shovel pictured abov
Write for new Mining Rope folde

union



How much is a good YAK worth to you?

Native Tibetan traders regard the yak as a pretty satisfactory means of hauling.

You might pick up one of these beasts, if you shopped around, at considerably less than the price of a new truck.

But we don't think you're interested. Because, aside from the maintenance problems involved, you know that yak power would prove to be a most expensive form of transportation. Despite the "attractive" purchase price, his limited working capacity makes him a poor investment.

The same principle applies to trucks. Low purchase price doesn't make a bargain. The only real bargain in trucking is more work per dollar of investment—and that's where Macks excel.

Dozens of "extras" in materials and workmanship go into every Mack truck—things like case-hardened, generator-ground timing gears that *never* wear out; rubber Shock Insulators instead of ordinary spring shackles; special, heat-treated steel alloys; and a Composite Rear Axle of new design and unequalled strength. When you buy a truck that's built that way, it lasts years longer, rolls more miles, hauls more tons. That's why, though the price is a bit higher, *a Mack costs you a lot less in the end.*

Mack
TRUCKS
FOR EVERY PURPOSE

PERFORMANCE COUNTS

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, New York. Factory branches and dealers in all principal cities for service and parts.

EXIDE-IRONCLADS

FOR EXTRA POWER . . .
FOR GREATER SAFETY

Maximum power . . . and maximum safety . . . are assured in mines where locomotives, trammers and shuttlecars are powered by Exide-Ironclads. These rugged, dependable batteries are designed and built to meet all conditions encountered in mine haulage operations . . . to deliver peak performance in steady, heavy service . . . and to reduce haulage costs per ton, per man.

Exide-Ironclads have the *high power ability* required for frequent "stop and go" service . . . a *high maintained voltage* throughout discharge . . . and a *high capacity* that assures sustained speeds throughout the day with full shift availability. You can always count on Exide-Ironclads for dependability, safety, long-life, economy and ease of maintenance.

If you have a special battery problem, or wish more detailed information, write for booklet Form 1982.

SAFE POWER

★ **MINE OPERATORS:** If you have not read the U. S. Bureau of Mines circular I. C. 7328, be sure to get a copy from the Bureau of Mines, Washington, D. C.

●

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

Don't let Low Power Factor ... kill YOUR

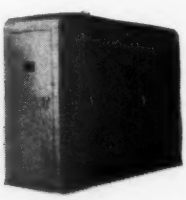
"Saved $2,000 in the first 4 months!" reports one mine operator after he had installed G-E pole-type Pyranol capacitors at a cost of $5,000.

Enclosed Capacitor Units

Intended primarily for individual-motor or small-load application. Available in ratings from 0.5 to 7.5 kvar, 230 volts; 1 to 15 kvar, 460 and 575 volts—for single-, two-, or three-phase applications.

Small Indoor Equipments

These units occupy little space and can be suspended overhead, if desired. Available in single-, two-, or three-phase ratings up to 90 kvar, 230 volts; 180 kvar at 460, 575, 2400, 4160, 4800 and 7200 volts.



Large Indoor Equipments

Particularly desirable where one large block of capacity is desired. Available in ratings up to 630 kvar, 230 volts; up to 1260 kvar, 460 and 575 volts; and up to 2520 kvar, 2400 to 13,800 volts incl. Supplied either with or without circuit breakers.

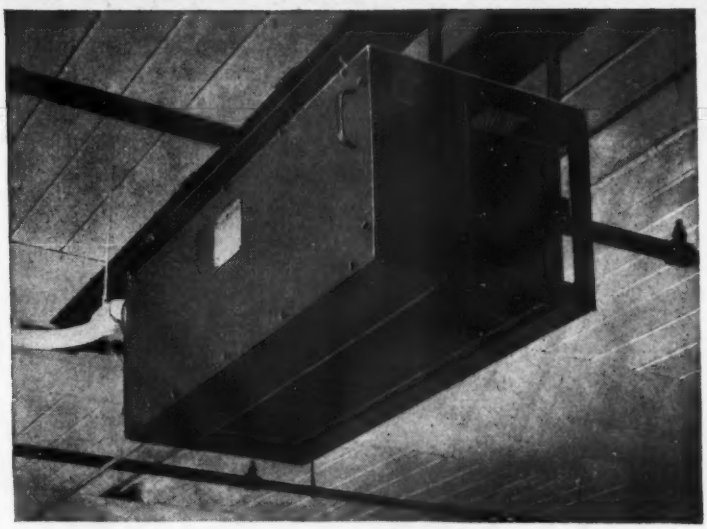
Pole-type Outdoor Equipments

Each unit has a completely weatherproof, all-welded steel housing suitable for either pole or base mounting. Designed for application to primary circuits of 2400, 4160, 4800 and 7200 volts in ratings up to 180 kvar, single-, two-, or three-phase.

Large Outdoor Equipments

This type provides large blocks of power-factor-improvement capacity. Completely weatherproof. Supplied either with or without circuit breakers. Available in kvar, phase, and voltage ratings which duplicate large indoor equipments.

In less than 2 years, this mining company had saved enough on its power charges to pay for its G-E capacitor installation.



Ceiling-mounted, dust-tight G-E capacitors save valuable floor space and can operate at high ambient temperatures.

MECHANIZATION GAINS!

★ POWER FACTOR—THE CRITERION OF "WORKING" POWER WHICH YOU CAN IMPROVE WITH G-E PYRANOL CAPACITORS TO SECURE LOWER POWER COSTS AS WELL AS A HIGH RETURN ON YOUR INVESTMENT

● The economies of mechanical mining can be seriously affected by a low power factor and the resulting high power costs. This needn't happen in your case—if you take advantage of the savings made possible by proper capacitor utilization. If you buy power from a utility and your contract contains a power-factor adjustment or kva-demand clause, capacitors can reduce your monthly bill by giving you more "working" power for every dollar you spend.

If you operate your own power plant, capacitors enable your generators to deliver more "payload" kilowatts—up to their maximum rating. In either case, they improve your voltage, reduce power losses, and help prevent system overloading. Very often, too, a capacitor installation permits the addition of more motors or other electrical equipment to a "fully loaded" system without the expense of additional feeders, transformers, or generators.

Users tell us that G-E capacitors return from 57 per cent to 120 per cent of their original cost every year. In other words, they pay for themselves many times over. Reliability of operation, of course, is essential before you can realize any worthwhile savings and G-E Pyranol capacitors are noted for the care and precision used in their manufacture. They're non-inflammable, hence less expensive to install. They are smaller than other types, require less space. And they have stable operating characteristics that assure long life.

Applying capacitors to secure maximum savings in mines, on surface properties, and in preparation plants requires careful study of your existing and anticipated circuits and power demands. General Electric engineers, because of their wide experience in this field, are able to render this service. Why not get in touch with the G-E office nearest you? *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

PYRANOL Capacitors

GENERAL ELECTRIC

PRODUCTION STEEL NOW!

Government-owned High Quality Surplus Priced For Substitute Uses

If you need fabricating bar alloy stock now and are willing to adapt top quality material priced at or near carbon steel prices—here is real opportunity. Over 25,000 tons of hot rolled and 25,000 tons of cold finished carbon and alloy steel bars are ready for immediate shipment to you. The stock is available in standard sizes, shapes, but is of above average grades. Accordingly it has been priced at levels such as to insure its quick employment to meet America's postwar needs. For details on F.O.B. locations, sizes, quantities and shipping arrangements contact your nearest W. A. A. Regional Office below . . . or clip and mail this coupon.

VETERANS OF WORLD WAR II: To help you in purchasing surplus property from W. A. A. a veterans' unit has been established in each of our Regional Offices.

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To War Assets Administration:

Please send me information on the availability and pricing of the following:

Carbon and Alloy Billets, Blooms, Slabs, Rods, etc. ☐
H. R. & C. F. Alloy Sheets, Strips and Plates. ☐
Stainless Steel Sheets, Strips, Standard Types. ☐
Valves and Fittings. ☐
Mechanical Tubing, Carbon and Alloy. ☐

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157-5

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SALES PRODUCTION for your COAL PRODUCTION is our business

The efficient production of SALES is just as important to a profitable coal business as is low cost production. Intelligent and persistent offering of your coals in EVERY market where they can be BEST applied assures your running time and insures your profit. We welcome your inquiry.

THE CLEVELAND-CLIFFS IRON COMPANY

UNION COMMERCE BLDG. • CLEVELAND 14, OHIO

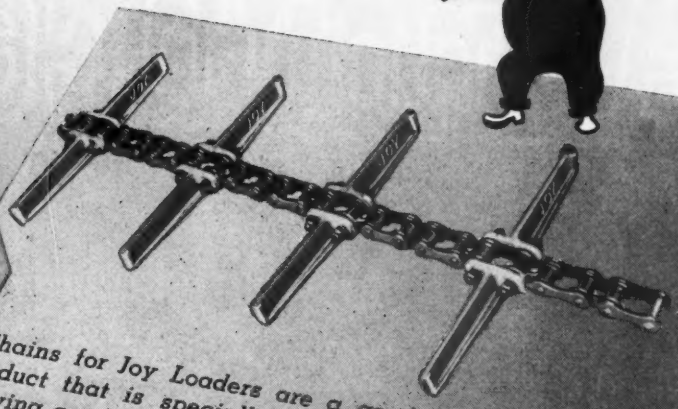
If it's TWINS you want it's TWINS you'll get . . .

Specify genuine JOY replacements

There's no guesswork about the fit and load-carrying ability of genuine Joy factory engineered parts. Each is precision made to carry its correct share under the most unfavorable operating conditions. You'll find it best to insist on genuine Joy factory-made replacements. Substitution of "pick-up" parts is dangerous—may lead to further breakdown of other equipment.

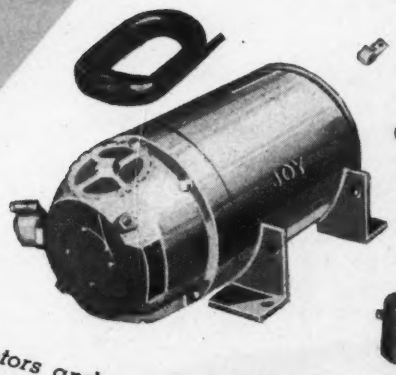
They're factory engineered to fit properly for long, hard usage.

Look for the name
IN GEARS
Joy factory-produced gears are made of special alloy steels—forged in plain words that means they're stronger, more durable—will wear better. What's more they're correct fitting—built especially for the machines you operate.



IN CHAINS AND FLIGHTS

Chains for Joy Loaders are a good example of a Joy product that is specially engineered for difficult load carrying conditions. They're extra-strong and assure long, trouble-free operation when moving the heaviest tonnages.



IN MOTOR PARTS AND CONTROLS

Since motors and controls are the very heart of Joy mining equipment it's doubly important that replacements for these be the best obtainable. Genuine Joy replacements work best, for they're specifically engineered for your Joy equipment.

the Services of a Joy Engineer are at your command

JOY MANUFACTURING CO.

FRANKLIN, PA.

GENERAL ELECTRIC

Announces . . .

NEW

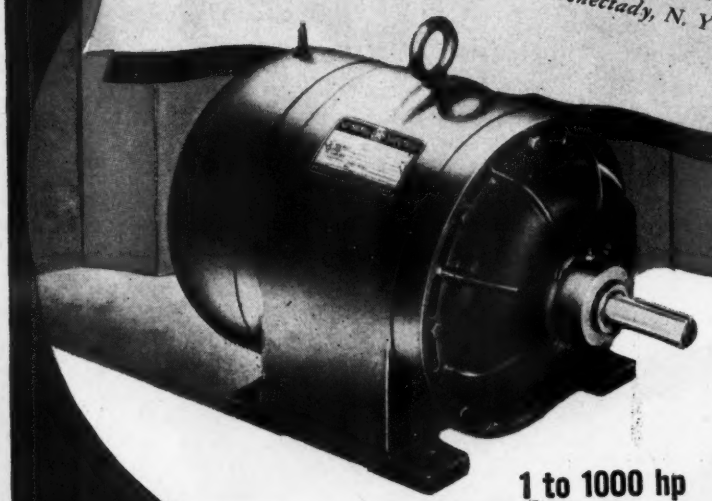
Totally Enclosed TRI CLAD MOTORS

In 1940, G.E. introduced the Tri-Clad open motor—with emphasis on the feature that industry wanted most in a motor, *protection*. Since then, more Tri-Clads have gone into service than any other integral-horsepower motor.

Today, we are ready with a new line of Tri-Clad motors—*totally enclosed, fan-cooled motors*—built on Tri-Clad design principles in both standard and explosion-proof types.

We believe that these are industry's most dependable motors. They are designed specifically for use in many adverse atmospheres—in iron dust, outdoors, in hazardous areas, and chemical atmospheres. Their scope of application is as wide as the field of industrial motor use. Safe-guarded against most sources of motor damage, their longer life and lower maintenance will make them economical motors for use on almost every job. *General Electric Company, Schenectady, N. Y.*

750-260-8030



1 to 1000 hp

COMPLETE ENCLOSURE FOR PROTECTION AGAINST DIRT, DUST, AND WEATHER

2080" OF HOLE IN COAL
71 HOLES IN ROCK —1207" OF DRILLING
50 HOLES IN COAL —2422" OF DRILLING
209'1" OF HOLE IN ROCK
KENNAMETAL
ROTARY BITS
REDUCE DRILLING COSTS 1/3 to 1/2
46 HOLES IN COAL —2346" OF DRILLING
10,200" OF HOLE IN COAL
71 HOLES IN ROCK —76'11" OF DRILLING
71 HOLES IN ROCK —923" OF DRILLING
5587" OF HOLE IN COAL
209'11" OF HOLE IN ROCK
275'5" OF HOLE IN ROCK
1488" OF HOLE IN COAL

THE Kennametal Bits shown drilled the footages noted *before being resharpened.* Many of them still do not need regrinding. All can be reground many times. Thus, total footage ultimately drilled with each bit is a score or more times the figure given. In fact, service results show that a single Kennametal Bit has drilled more than 30,000 feet of hole in coal—*equivalent to approximately 9,000 holes, forty inches deep.*

Kennametal Bits are entirely unlike any other drill head available. The brazed-in cutting tips are tough, hard Kennametal; the body is a *one-piece* alloy steel drop forging, heat-treated; the design is such that gage is continuously maintained. There are no wedges or screws to come loose and delay operations; no need to over-drill to compensate for bit wear; no danger of blow-outs due to hole taper.

Kennametal Drill Bits keep skilled men on the job drilling holes instead of changing bits; permit effective drilling in roof and floor shale; lessen wear and tear on drilling machines; reduce power consumption—actually have demonstrated that they may save up to 50% of drilling costs. *Want more information?* Write, giving details of your operations.

KENNAMETAL
DOUBLE SPIRAL AUGERS

make fullest utilization of advantages inherent in Kennametal Drill Bits. These augers are double-spiral, solid-center rolled shapes, made of forged alloy steel, heat-treated. Write for particulars.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
TRADE MARK REG. U. S. PAT. OFF.

KENNAMETAL *Inc.*, LATROBE, PA.

SURPLUS HOBART ARC WELDERS

200, 300 AND 400 AMPERE RATINGS

Three million dollars worth of surplus Hobart Arc Welders *must* be sold between May 15th and June 15th. Most of this equipment is of the MG type but some quantity is available in gasoline driven units. Arrangements may be made to inspect the offered items. Largest inventories are located at Boston, Detroit, Cleveland, Chicago, Atlanta, Kansas City, Richmond and Philadelphia—but information on availability, condition and location may be obtained at any of the War Assets Administration Regional Offices listed below. The equipment will be sold on a "where is, as is" basis . . . used or unused . . . and priced accordingly. For full information contact the nearest office listed below or check and mail this coupon.

ALSO MANY OTHER TYPES OF WELDING AND FLAME CUTTING EQUIPMENT

LINCOLN

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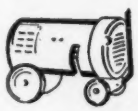

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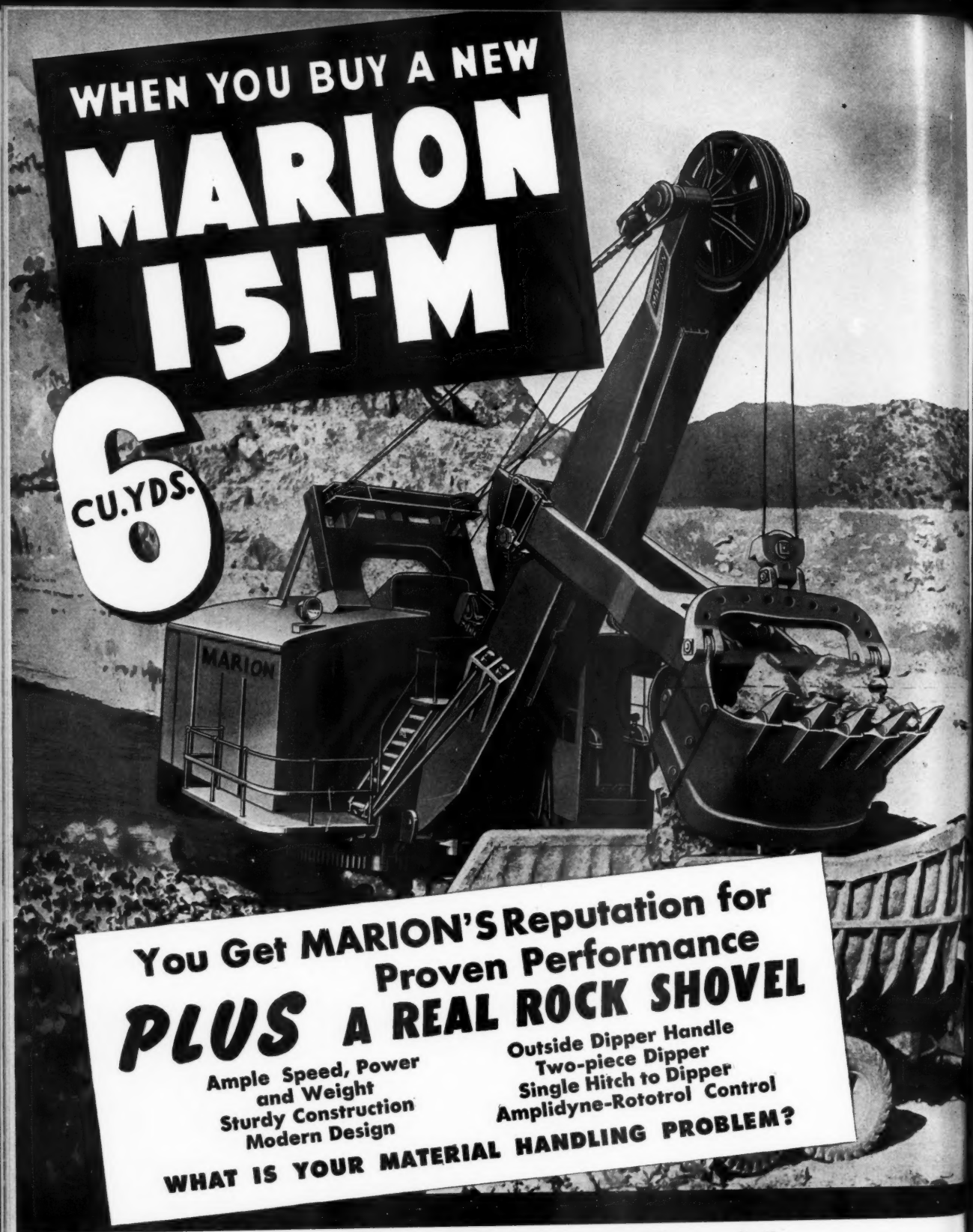

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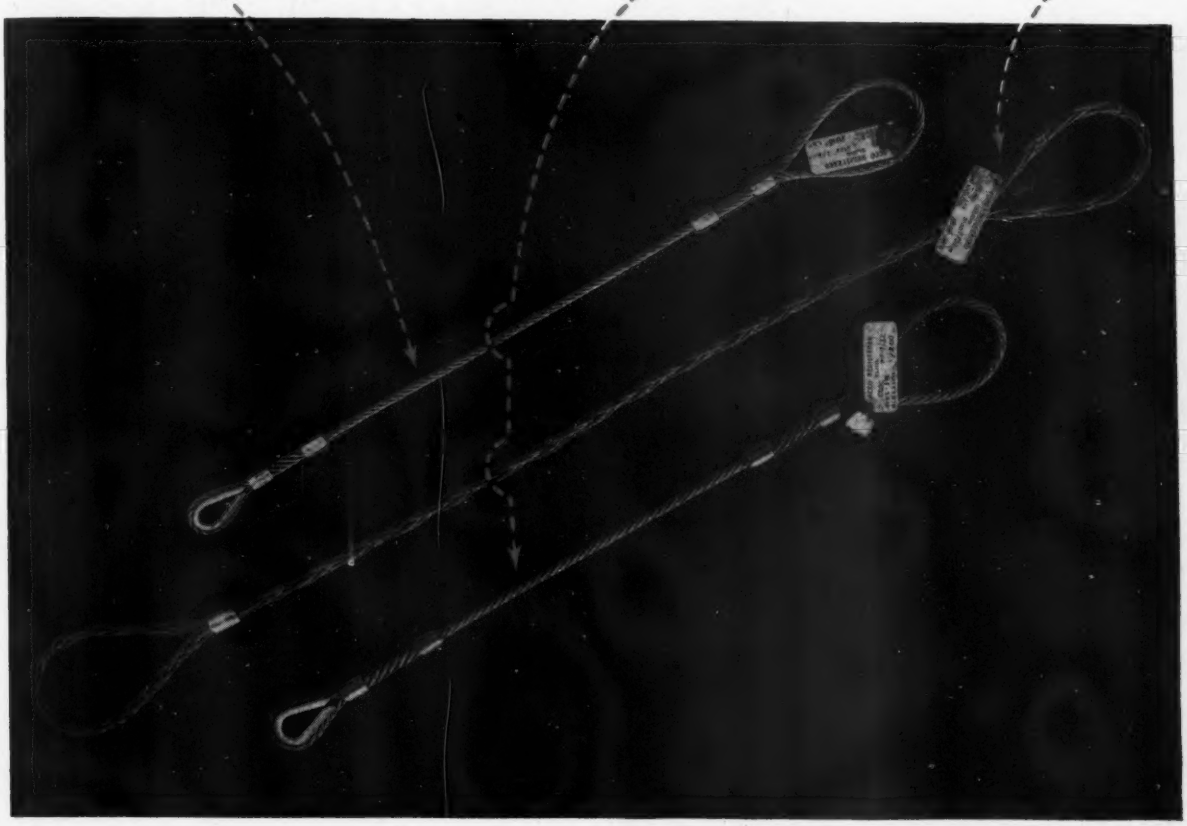

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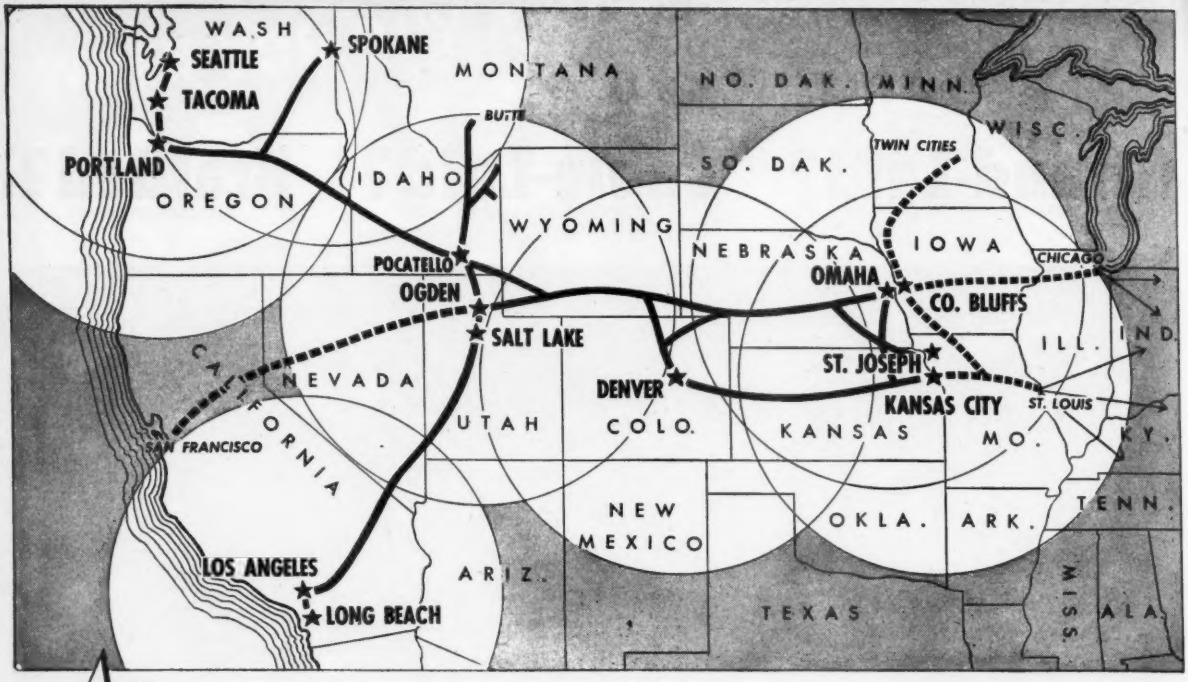

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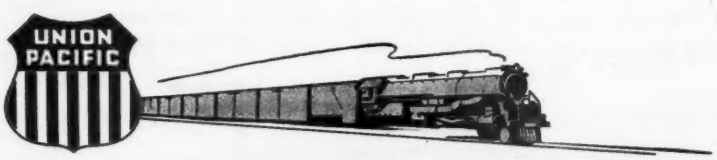

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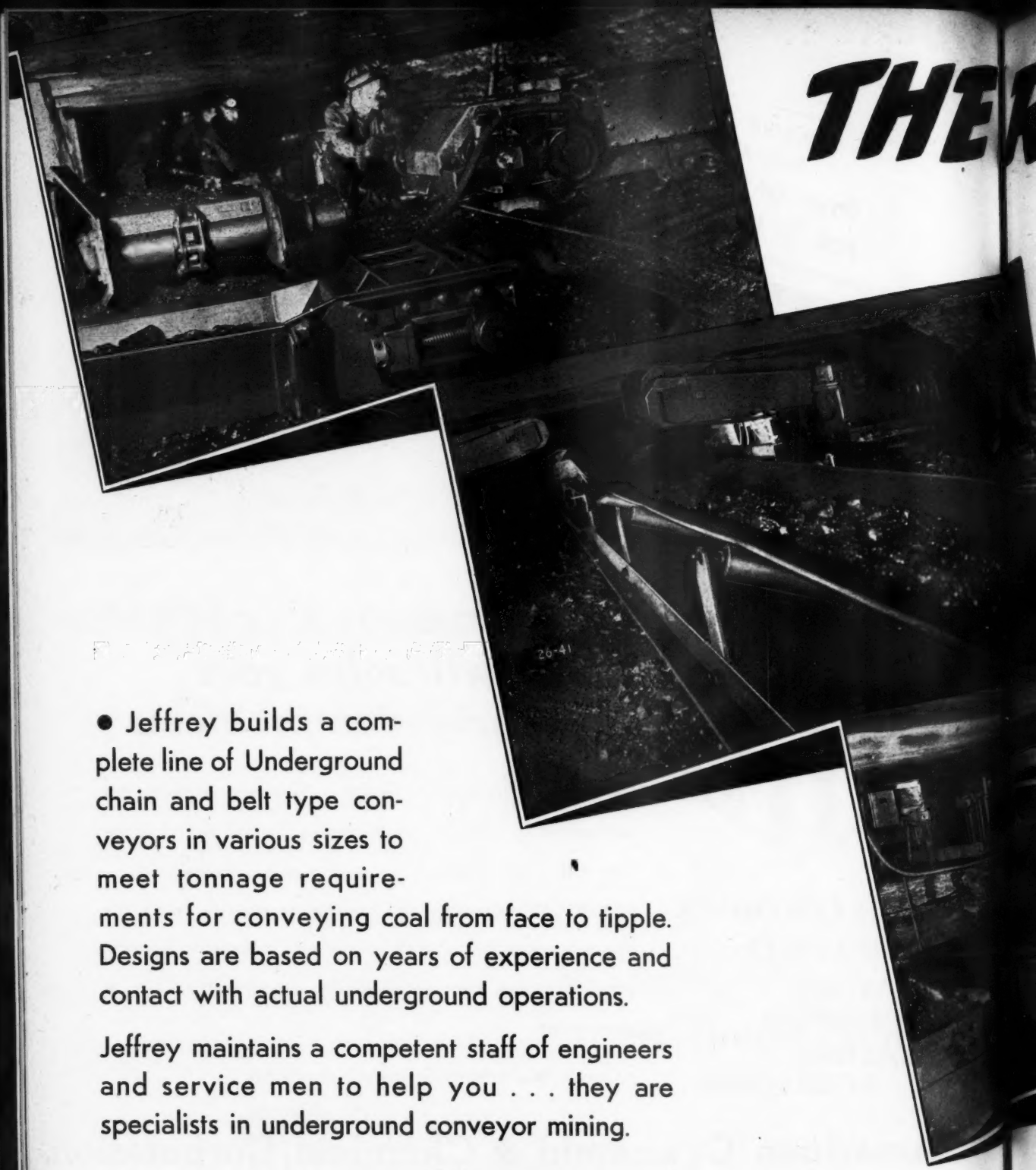

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★ Editorial ★

JULIAN W. FEISS, Editor

Atomic Power

IT IS generally conceded that the most remarkable discovery of our time, possibly the most revolutionary achievement in the history of mankind, has been brought about by scientific and engineering skill during the period of the war years here in the United States. Atomic energy is now an accomplished fact and no longer a dream of alchemists and a few theoretical scientists. Unfortunately the relationship between mass and energy, as exemplified by this process, is so foreign in concept to the average layman that comprehension of the significance of this discovery is largely lost. Most of us are not sufficiently educated in the language of nuclear physics to appreciate the results of this scientific achievement.

It is also unfortunate that this discovery had to be launched in a world at war. The requirements of military security and the needs to safeguard our national heritage are obvious, but it is equally evident that a process of such importance cannot be kept a secret forever.

There are two aspects to the subject of atomic energy, the military and the economic. We are not directly concerned with the military aspects—that is the job of our military experts—we are, however, very deeply concerned with its future power application. Any intelligent, technical man who has read the official government report entitled "Atomic Energy for Military Purposes" by Henry D. Smyth, is sufficiently aware of its implications to see that so revolutionary a discovery may change completely America's industrial future.

Many amazing claims are made for atomic power. We are told that some day it may supplant coal and hydroelectric energy. We have been told that atomic power will in time replace the need for oil as a power source and that the internal combustion engine may become obsolete. Needless to say, the MINING CONGRESS JOURNAL does not recommend that coal producers close down or that the oil industry curtail production. From all that can be gathered amidst the welter of conflicting rumor, one concludes that atomic power may serve as an adjunct rather than as a replacement to other power facilities, at least for a long time to come. The radiation danger accompanying the process of nuclear fission has been thoroughly discussed in the Smyth Report and this hazard is a serious problem. In addition, the size and expense of installations would indicate that some time must pass before power plants operating on atomic energy will be built throughout the United States.

With the war over, do we need to maintain secrecy as regards the non-military aspects of this discovery? The greatest secret of all has been announced already; the fact that nuclear fission is possible. The moment the press described the bombing of Hiroshima the world knew that the impossible had been accomplished. We know from the Smyth Report that the atomic pile is used in the manufacturing of plutonium, one of the ingredients of the atomic bomb. However, is the only application of the pile a military one? Believing that a well-informed public is necessary to the life of our Nation, we ask the following questions: Would the disclosure of technical non-military aspects of atomic energy jeopardize the military security of the United States? Would not disclosure and dissemination of the basic facts be helpful both to industry at large and to the producers of mineral fuels, in understanding more clearly the implications of this possible new energy source on their own future?

The Power to Tax is the Power to Destroy

IRRESPECTIVE of whether or not the coal strike is settled by the time we go to press, the problems involved are so fundamental that the American people will have to choose between anarchy and law in the industrial establishments of this country.

The power to tax is vested in the Congress by our Constitution. The United Mine Workers of America are now demanding the right to levy a private tax amounting to 7 per cent of bituminous mine payrolls. If this right is upheld, Mr. Lewis' treasury would gain approximately 70 million dollars annually and other unions would be forced to demand a similar levy. It appears that such a tax on manufacturing corporations alone would exceed 4½ billion—equivalent to the total Federal corporation and individual income tax for 1937. This entire tax burden would be born by the consumer; the public would pay the bill and such inflationary practice would wreck post-war recovery. It is intolerable that the American people be blackmailed by a ruthless minority whose sole object is that of complete domination over industry.

The ultraviolet unit is readily used in the mine or in the field

★

By JACK DeMENT

Research Chemist
Fluorescence Laboratories
Portland, Oreg.

★

Locating Uranium With the Ultraviolet Lamp

Detection of Uranium Minerals is Greatly Simplified by Use of Ultraviolet Light and Numerous Finds Have Resulted from the Application of This New Technique

EVER since its discovery in 1786 uranium has been associated with great events in science. Our knowledge of matter is due in part to studies made on its compounds. The present understanding of luminescence and optics is integrated with early studies on uranium salts and radioactivity was first observed in a mineral bearing uranium.

Recently, with the reduction of atomic energy theory to practice, uranium and its ores have assumed immense significance. It is therefore important to extend the known sources of this material, and to do it by means readily available to all who wish to employ them.

The ultraviolet lamp has in recent years proven highly satisfactory for prospecting and detecting uranium in various minerals. Its values for this purpose have not been widely appreciated, since the lamp is also useful for locating and appraising such valuable commodities as zinc and tungsten, as well as petroleum. But this overshadowing of the utility of the ultraviolet lamp and fluorescence tests for uraniferous materials no longer exists. Atomic energy has emphasized the need for simple, quick and reliable methods, for which ultraviolet light is the answer.

The usual chemical and physical techniques employed for uranium exploration and analysis are often time-consuming, expensive and difficult to use. It is for this reason that prospectors, mining engineers, chemists and physicists now very frequently rely upon the ultraviolet lamp.

Discoveries With the Lamp

A number of uranium localities have actually been discovered by use of the ultraviolet lamp. In other instances, the lamp proves a valuable adjunct in tracing veins of primary ore by the fluorescence of secondary uranium minerals. Outcroppings of primary ore frequently yield to an ultraviolet inspection, since they may be covered with secondary minerals. It is difficult to state exactly to what extent the ultraviolet lamp is now being employed in uranium exploration, and this is especially true of the last four years. The secrecy measures during the war have not permitted publication of the methods used on uranium workings in most of the major localities, but some information has been known or is now available for the first time.

In the Great Bear Lake regions of Canada, the secondary mineral zippeite shows the presence of pitchblende outcroppings by its bright fluorescence. Two new regions in California have been prospected by the lamp. One of these, at Randsburg, yields a secondary mineral of uncertain composition, a species that is probably akin to schoepite. The Randsburg mineral fluoresces brilliantly, and pockets of the ore can easily be

located in a pulverulant gangue earth with the lamp. The other California locality, at Darwin, provides a green fluorescent uranium mineral that has not been identified. Veins of the Darwin material can easily be followed with ultraviolet light.

Dakeite, or schroeckeringite, was first discovered near Wamsutter, Wyo., by its intense yellow-green fluorescence. This rare species is found disseminated throughout gypsite as small particles and as small yellow-colored nodules. Most of the better specimens of dakeite have been selected under the ultraviolet lamp.

Dozens of localities throughout the world have first been discovered uraniferous by fluorescence. These areas yield silicas and opals which have a bright yellow to green fluorescence, indicating trace amounts of uranium. The lamp is the only method known by which uranium can be positively identified in the silicas, since the concentration of uranium is far below the limits of the most sensitive physical and chemical tests available. Last year, for example, an enormous deposit of uraniferous silica was discovered near the Mutton Mountain locality in Oregon, and this discovery was directly due to an ultraviolet examination. While this silica, and others in the same class, has no commercial value as an ore, choice specimens bring high prices as collectors' items. Another illustration of uraniferous silica is the material found in Nevada, Colorado and Wyoming.

It is of considerable interest to know that otherwise non-fluorescent glass secured after the atomic bomb explosion near Hiroshima, Japan, exhibits small inclusions of bright yellow-fluorescent material, essentially similar to luminescent uranium salts. The writer has examined samples of fused glass taken at a distance of some two miles from the atomic explosion, and has observed this remarkable response to the lamp. Samples of this glass also show areas with a bright orangish fluorescence under ultraviolet light. The body of the glass samples examined by this writer do not exhibit a marked fluorescence, and the response is limited to select areas and small inclusions.

The Uranium Minerals

Minerals bearing uranium are not always of economic importance. A number of rare uranium minerals are known which cannot be used for sources of this element since they are not found in sufficient quantities. The two principal commercial uranium ores found in the United States are carnotite and pitchblende, the former supplying vanadium, and both comprising sources of radium.

However, the rarer uranium minerals prove of value in a most curious way. The occurrence of certain rare uranium minerals may be important in that they often indicate the presence of larger bodies of ores. Likewise, a positive test for uranium also shows the presence of radium, as the two invariably accompany each other in minerals, so fluorochemical methods in this field serve in a dual capacity.

The United States Bureau of Mines classifies the uranium ores as of three general types, and the distinctions between the three must be kept in mind when prospecting for the minerals with the ultraviolet lamp. These varieties of uranium ore are:

(1) The *uraninites*, which are richest in uranium, include the crystalline varieties such as broeggerite, cleveite, and nivenite. These varieties occur in pegmatites and often are found as well-developed crystals. The word "pitchblende" refers to the amorphous uraninites which are often found in metalliferous veins and associated with various sulfides, including zinc, silver, lead and cobalt. The so-called colored "bloom" that is seen in an outcropping of a rich pitchblende deposit is due to these sulfides, especially cobalt. The terms "uraninite" and "pitchblende" are used synonymously, but the latter term is generally applied only to the amorphous and impure forms of the mineral.

Pitchblende often occurs with botryoidal surfaces and a characteristic conchoidal fracture. It is black or grey-black in color, often with a glossy or pitch-like luster. The mineral from the Great Bear Lake, Canada, locality is brown-black on a freshly broken surface. The hardness of pitchblende is about the same as steel (5.5), and its specific gravity may range between 5 to over 9.5.

(2) *Carnotite* is representative of this class of uranium ores. It is an amorphous, soft, powdery material, occasionally talcose or waxy in character. The color is generally a brilliant canary yellow, though it may be discolored by other materials such as iron and organic matter, and as it is found disseminated throughout various sedimentary rocks it may not present the typical yellow color. Carnotite is the principal uranium ore of the United States. The type 2 uranium ores are also called the "secondary uraninites," since they frequently are alteration products of pitchblende or the "primary uraninites." Carnotite, however, may be considered an exception to this.

Other important secondary ores of this class include autunite, tyuyamunite, dakeite (or schroeckeringerite.) Usually these minerals are uranium or uranyl phosphates, arsenates, sulfates, silicates and vanadates, together with alkali or alkaline earth elements such as sodium or calcium.

(3) *Columbium-titanium-tantalates* —These ores are seldom found in large amounts, though they may be found dispersed in granular form in sands, especially the "black sands" of river beds. These minerals all have common characteristics and are easily recognized by their high density (over 4), black or dark brown color, and greasy, brilliant fracture. Minerals of this group were first discovered in Norway and Greenland (euxenite, bloomstrandite, samarskite, and fergusonite), but later they were found in Brazil and Madagascar in considerable amounts.

Ultraviolet light equipment is easy to carry

Uranium Prospecting

More than 100 uranium-bearing minerals have been described during the last century. Commercially, few of these are important, and two, pitchblende and carnotite, provide the major portion of the world's supply of radium and uranium. The most important uranium ore is pitchblende, also principal source of radium.

Uranium is a comparatively rare element, mineralogically speaking. It ranks 18th in igneous rocks, occurring in these substances at concentrations less than 0.01 but over 0.001 per cent. Its ores, of course, contain greater amounts of the element. The accompanying table 1 shows the average amount of uranium in some of its more important minerals.

Table 1

URANIUM MINERALS

Mineral	Per Cent U_3O_8
Ampangabeite	14 to 20
Autunite	60
Betafite	26 to 30
Bloomstrandite	20
Broggerite	77
Carnotite	61 to 67
Chalcolite	55 to 60
Cleveite	57 to 72
Curite	up to 73
Euxenite	3 to 19
Fergusonite	2 to 9
Gummite	60 to 70
Johannite	66
Liebigite	37 to 38
Pitchblende	75 to 95
Samarskite	3 to 16
Thorianite	5 to 12
Troegerite	66.3
Uranophane	52 to 65

All uranium minerals are potentially fluorescent, if not actually so. This fluorescence is best evoked by short wave-length ultraviolet radiations, such as are supplied by the Mineralight lamp. Solutions of uranium in a certain chemical condition are also fluorescent, but the solids show this property to a marked extent. With rare exception, the fluorescence of uranium minerals, before or after special treatment, as well as the solutions, is a characteristic, green, yellow, yellow-green or yellow-blue color. Dispersed in silicas, concentrations of uranium far below the limits of ordinary chemical tests show their presence by a bright fluorescence. The yellow fluorescence of certain Wyoming and Nevada opaline silicas is due to trace amounts of uranium.

The portable cold-quartz Mineralights are specially useful for field work, since they provide the 2537 A. U. ultraviolet light that excites the best response.

The primary uraninites (pitchblende) and the columbium-titanium-tantalates are generally non-fluorescent, but the secondary uranium minerals are frequently brilliantly fluorescent. Since the secondary minerals are often associated with the primary ones, their fluorescence may indicate an outcropping of a larger, more valuable body of a primary ore.

De Ment and Dake cite the 1940 investigations of Miexner on the fluorescence of uranium minerals, and mention of this work is important with its connection to ultraviolet prospecting. Miexner classified the uranium minerals into (a) strongly luminescent, (b) weakly luminescent and (c) non-luminescent, according to their response under ultraviolet light. These investigations qualify the fact that primary uranium minerals are usually not fluorescent, while the secondary ones often are.

Fluorescent Uranium Minerals

The strongly fluorescent uranium minerals are the uranium phosphates, arsenates, sulfates and others which fluoresce with a strong yellow-green color. The uranium carbonates fluoresce more of a green color. The non-luminescent uranium minerals include the silicates and uranium micas of composition expressed by the following:

$$M_2(UO_2)_2\ (XO_4)\ .nH_2O$$

where M may be copper, iron, lead, bismuth, manganese or uranium dioxide. X may be phosphorus, arsenic, vanadium, or sulfur, and n from 8 to 12.

The non-fluorescent uranium minerals usually have a drab color, often being black or brown. The fluorescent, secondary minerals are usually lighter in color, sometimes being light yellow, and generally have specific gravities approximately half of the pitchblendes. The following table 2 lists the fluorescent responses of uranium minerals under the Mineralight, these color values being seen irrespective of the locality.

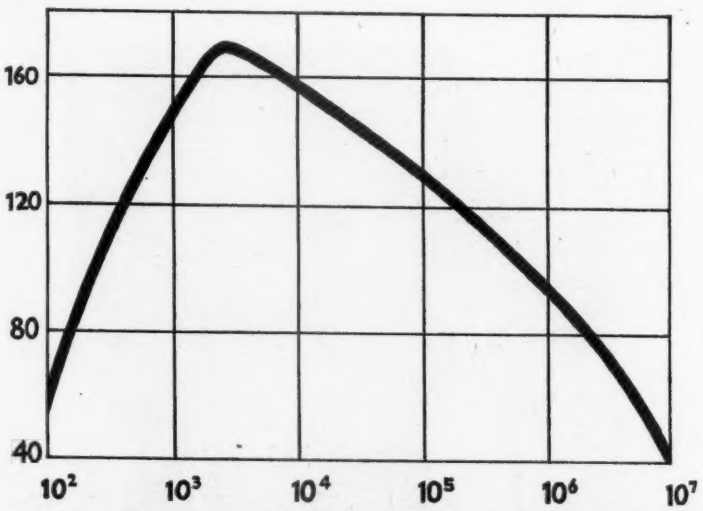
Table 2

FLUORESCENT URANIUM MINERALS (3)

I—Strong Fluorescent	
Autunite	Yellow-green
Beta-uranopilite	Yellow-green
Chalcolite (cf. torbernite)	Yellow-green
Johannite (variable)	Yellow-green
Metatorbernite	Yellowish-blue
Schroeckeringite (Dakeite)	Green
Torbernite	Yellow-green
Uranocircite	Yellow-green
Uraniferous hyalite	Yellow-green
Uranophane	Yellow-green
Uranopilite	Yellow-green
Uranospathite	Yellow-green
Uranospinite	Yellow-green
Uranothallite	Green
II—Medium Strong Fluorescent	
Gummite (variable)	Violet
Beta-uranotile	Yellowish
Uranotil	Yellowish
Zippeite	Yellowish

In prospecting for uranium minerals in the absence of reliance upon other physical and chemical tests it is recommended that known specimens be examined with the lamp before appraisal of an unknown sample is attempted. Pure uranium compounds, such as uranyl nitrate or acetate, which can be obtained from chemical supply houses, exhibits the typical yellow-green fluorescence of these substances under the Mineralight.

Failure to note fluorescent uranium minerals in the field may not mean the absence of pitchblende or carnotite, as indicated previously. Hence, it is advised that chemical tests, which are easily employed in the field, be relied upon for the final qualitative test. Several fluorochemical tests for uranium can be used, and if learned by practice with samples known to



Nichol's curve showing the optimum concentration of uranium molecules in a sodium fluoride base. The fluorescence can be detected when the uranium is diluted out in 10,000,000 parts of sodium fluoride, and the brightest response is seen when the dilution is 1:2000

bear uranium, satisfactory results will be obtained.

Fluorochemical Tests

When dissolved in water, and in the absence of certain interfering elements, the oxygenated uranium compounds, i.e., those containing the so-called "uranyl" (UO_2) group, fluoresce brightly under the Mineralight. This glow is better seen with the radiations released by this lamp than by the units which generates the long wavelength ultraviolet rays. This is equally true of traces of uranium dissolved or disseminated in a solid base material like silica or some chemical compound like sodium fluoride.

The primary uranium ores are generally those to which attention is directed in qualitative tests since they do not appear distinctive under the lamp, but after treatment will show their presence by fluorescence.

In all of the simpler, qualitative fluorochemical tests for uranium, as well as the more involved wet-quantitative methods, it is necessary to get part or all of the uranium in the specimen into solution. For qualitative work only small specimens of minerals are required and complete solution of the sample is not necessary.

All uranium ores are attacked by aqua regia or by nitric acid, with the exception of a few which respond to hydrofluoric acid. In the simple tests a solution may be secured by merely boiling a few grams of the sample in 10 ml of aqua regia or nitric acid.

The following methods of testing have been found to be extremely sensitive for detecting uranium, so they are here presented for those who wish to employ them in the field or in the laboratory in connection with the Mineralight. The method selected will depend upon the operator and the conditions under which he works.

Bead Tests

The bead test comprises the fusion, on the tip of a platinum wire with a loop in the end, of an inorganic salt like borax or calcium fluoride with a small amount of the unknown. The bead may be formed in the flame and then dipped into a solution of the unknown, re-fused, re-dipped, re-fused, and so on, until a fairly large bead is obtained.

Sodium, potassium, or calcium fluoride is the best bead material for uranium tests. A pure, non-fluorescent fluorite can also be used. Borax proves satisfactory. While fine particles of the mineral sample can be fused directly into the bead, it is best to dip the bead into a solution of the sample during the test. When the bead is completely formed, and after it has cooled, it is examined under the Mineralight. If uranium is present, the bead will fluoresce a bright green, yellow-green or lemon-yellow color. The sensitivity of bead tests, when ultraviolet inspection is used, is great, as little as one molecule of uranium compound in 10 million of bead material causing the fluorescence. This corresponds to far less than a millionth of a gram of uranium.

Before using the bead test, pure uranium compounds and samples of pitchblende or carnotite should be used to make up standard for comparison. The bead test may be used quantitatively, but special equipment and standardized working conditions are required (see ref. 4).

The Zinc Test

The writer has developed a simple test for uranium which can be used in conjunction with the ultraviolet lamp. All that is required, aside from the Mineralight, is a small bottle of aqua regia (a mixture of 1 part nitric acid and 3 parts hydrochloric acid) and a box of granular zinc of good purity. The procedure is to heat five grams

Sorting secondary uranium minerals under ultraviolet light

of the finely ground mineral sample in 20 ml of aqua regia for several minutes, complete solution not being required. This liquid is diluted out with 80 ml of water and several lumps of granular zinc added. The preparation is then allowed to stand for up to half an hour, and the lumps of zinc are removed before they dissolve.

The lumps of zinc are then gently flamed over a bunsen burner until a pale yellowish coating begins to form on the surface. At this stage the zinc is allowed to cool and inspected under ultraviolet light. In the presence of uranium, bright yellow or green fluorescent spots will be observed over the zinc. If the results are negative, the lump of metal is further heated and after cooling, re-examined.

Care should be taken not to overheat the zinc, since it fuses rather easily in the flame, although at temperatures of incipient fusion the coating on the zinc will show several color changes — from pale yellow, through deep yellow, becoming orange, then orange-red, and finally ending in a dark brownish deposition. That is, these color successions will be seen when the sample contains uranium.

The zinc test is very sensitive, responding to carnotites with less than 2 per cent uranium oxide present. With the amount of material dissolved from pitchblende by the means mentioned above, it will also give positive results. However, tests should be conducted with uranium salts and known samples before attempting its use on an unknown. It is convenient to save the lumps of zinc which do show uranium for comparison in subsequent tests. In certain cases the fluorescent specks will appear bluish hues of yellow or green—these may be taken as positive—but bright blue areas, which are due to reflections on a shiny metal surface, should be discarded. With a little practice, the zinc test will yield reliable results.

U. S. Bureau of Mines Test

Sill and Peterson, working at the U.S. Bureau of Mines Experiment Station in Salt Lake City, Utah, have developed a simple, but reliable fluorescence test for uranium using the Mineralight. They state that the available methods for detecting uranium have lacked one or more of the desired characteristics, and that this method is probably more specific and sensitive than the usual qualitative methods for uranium. Its speed of application and simplicity make it ideal for testing samples prior to quantitative analysis.

The fluorescence test has been tried for over 2 years by these workers on various types of uranium minerals with very reliable results. Samples submitted for uranium analysis can be tested at the outset for uranium—those containing uranium can be subjected to the more complicated and accurate quantitative tests, but those containing no uranium can be eliminated, thereby effecting a large saving in time and expense. The test has the advantage of using up none of the sample; it is an integral part of the quantitative scheme of analysis, so if uranium is found, the analyst can continue on with the quantitative determination.

Sill and Peterson took advantage of the observation of De Ment and Dake that aqueous solutions of uranium are much more responsive to short wavelength ultraviolet light than to long wavelengths. Their test readily detects as little as 0.3 mgm of uranium at a dilution of 1 to 1 million, but if smaller volumes of uranium extract are inspected, the delicacy of the test is increased greatly.

Uranium Guide Summary

In 1940 the writer outlined a tentative guide to be used in prospecting for radium and uranium minerals. This can be adapted to prospecting for uranium by means of fluorescence, and the eight points should be kept in mind when using the lamp. A general summary and guide of the fluorescence characteristics of uranium minerals includes:

I. Primary uraninites (pitchblende) do not fluoresce.

II. A number of secondary uranium-bearing minerals are highly fluorescent, i.e., those which contain the uranyl group. In chemical tests which alter primary minerals substances are produced which compositionally are analogous to the secondary minerals.

III. In practically every case of fluorescence the characteristic yellow-green, or a hue of this, is observed.

IV. Generally, the more soluble uraniferous minerals are those which are fluorescent.

V. The largest number of fluorescent uranium minerals are those which have a specific gravity of approximately 3.5. Few with a high gravity fluoresce.

VI. Fluorescence is best excited by short wavelength ultraviolet radiation, e.g., light from the Mineralight —wavelengths of 2537 A.U.

VII. Primary uraninites after weathering frequently alter to secondary and fluorescent species. In this way a dual detection may be made with the lamp.

VIII. The presence of uranium invariably presupposes the presence of radium.

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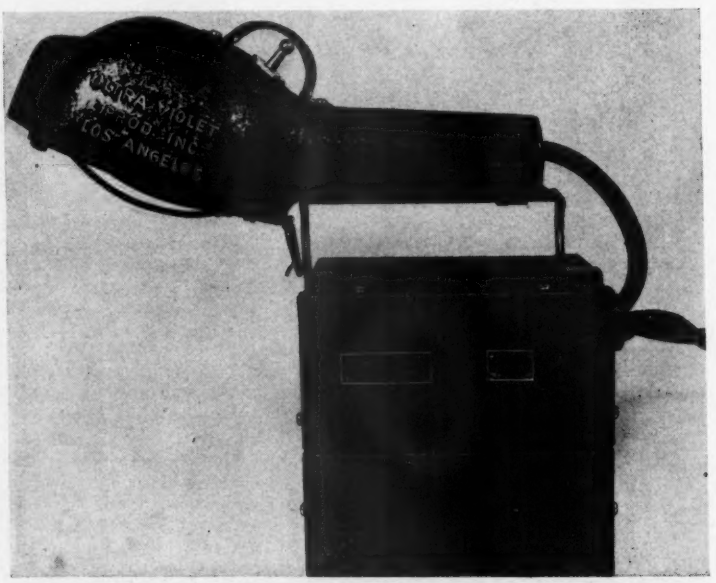


Short wavelength ultraviolet lamp equipped with filter. This unit is preferred in all work on uranium minerals

Modernizing the Mines of Ohio

Starting Near the End of the Last Century, the Trend Toward Mechanical Methods Has Progressed Steadily Forward

By L. J. LORMS
General Manager
The Lorain Coal & Dock Company

MECHANIZATION of coal mining in Ohio was initiated during the early 1880's, when air punchers began to displace manual efforts for undercutting the face. Since then the mining industry of Ohio has played an important part in the early development of mechanical coal cutting, as most of the pioneering in this class of equipment was carried on in various mines in our state.

Mining men recognized the many deficiencies of air punchers for coal undercutting, and several manufacturers brought out experimental types based on the chain principle that led to the design of the breast machine. Further development of chain cutters continued, with the ultimate objective of performing a continuous operation; these experiments reached success and resulted in the first machine of this type which was installed at Salineville, Ohio, in the year 1907. This was followed by a similar type machine installed at the Eclipse mine of the Lorain Coal & Dock Company, at Hocking, Ohio, and the name "Shortwall" was here adopted and trade-marked by the manufacturer.

Improvements and higher cutting capacity soon established the reliability of the Shortwalls which outmoded the breast machines and superseded their use in the 1920's. During this period, the Arc wall machine was designed and perfected for use where conditions were favorable for its operation.

Power Supply and Distribution

Mechanization is the application of power to mining methods, and a close relation therefore has been maintained between the progress of mechanization and the development of adequate power supply. In 1914 the Ohio Power Company began to build its system of transmission lines throughout the Eastern Ohio coal fields, which made purchased power available to the mines in this district. The individual steam plants that had furnished power previously were gradually replaced by substations that converted the purchased alternating current to direct current, as practically all mining machinery operates on direct current.

The three methods used in changing AC to DC as commonly used are: the motor-generator set, with an AC motor driving a DC generator; the rotor-converter, which is an AC motor and DC generator combined; and the mercury-arc rectifier, which changes AC to DC through a mercury arc. At first the substations were located outside, as close to the mine portal as possible, because the DC power was used for cutting machines, haulage and gathering motors only. Practically all fans were now driven by AC motors, and a few motors were installed in machine shops and tipples. This applied to the hand loading coal mines.

Then mechanized mining, with power loading machines, conveyors, shuttle cars, larger cutting machines and more gathering and haulage motors inside and cleaning plants outside, changed the power situation again. The outside substation was unable to handle this increased load;

The forerunner of the modern coal cutter

Photographs courtesy Jeffrey Mfg. Co.

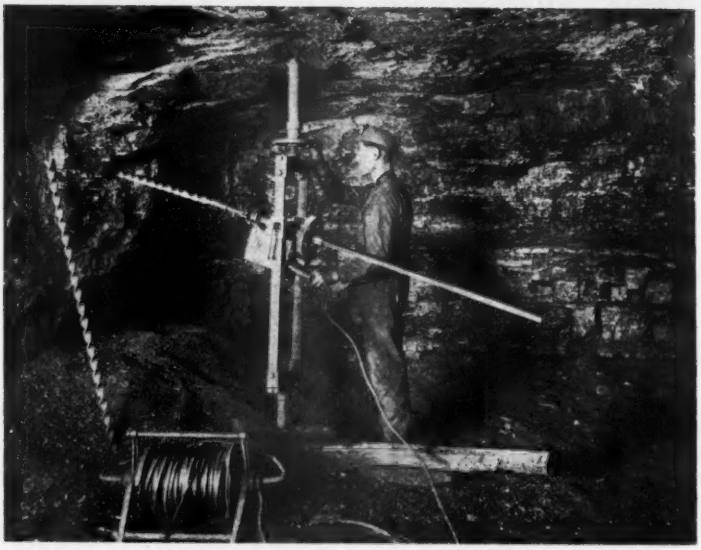
and as it was not practical to increase substation capacity outside, new substations had to be located close to load centers inside. Some companies solved this by using portable substations and underground cable. Others used surface transmission lines and by drilling through overburden to the coal seam, located their substations inside close to the load center. Others built substations on the surface and through bore holes fed the DC power to the load centers.

Haulage

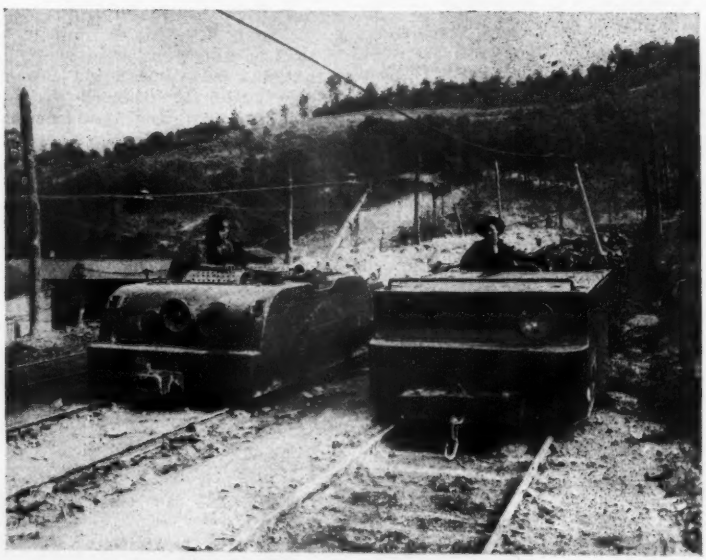
As motor haulage replaced mules and cutting machines increased the amount of coal mined, great changes were brought about in the design of mine cars in order to increase their capacity. For instance, the mine cars in use 25 years ago were of very small size, plain bearing wheels, wood bodies held together by belts of iron, and coupled together by chain hitching, stiff one-piece hitchings or single link and pin. These cars held 2,000 to 3,000 lbs., and were designed for animal haulage or very slow locomotive haulage.

The advent of mechanization created a demand for a large size car of modern design, equipped with friction bearing wheels, automatic couplers or spring bumpers and link and pin couplers. These cars, which are constructed of steel, run up to 20,000 lb. capacity and are built for high speed and low cost transportation service.

Locomotives of 25 years ago were small in size, had small tractive effort, and gave low speed service. The needs of today are adequately taken care of by our modern locomotives which are up to 26 tons in weight, equipped with anti-friction bearings, and designed for high speed and high tractive effort. Some are furnished with air brakes and air sanders. The modern haulage system in mines is comparable to quite a degree with a modern railroad system, having dispatchers, block signals, electric switch throwers, etc.



Coal drilling with an electric augur in 1910



Ten-ton mine locomotives 30 years ago

Mechanical Loaders

The first semi-mechanically loaded coal in Ohio was shoveled by hand onto a small pit car loader. Then came chain and flight conveyors and shaker conveyors, onto which the coal was shoveled by hand and next came the duckbill loader attached to the shaker conveyor.

The duckbill is particularly adapted to the conditions in the No. 8 Field, where the roof poses a serious problem to any mechanical method of mining. The top immediately over the coal is a draw slate and some means must be devised for either holding the strata in place, or else installing a suitable mechanical preparation plant for removing resultant impurities if they become mixed with the coal. With duckbill loading, a system of roof control is possible which holds the draw slate until the coal has been loaded, so that mechanical cleaning is not a necessary accessory. Appreciation of this advantage accounts for the fact that approximately 175 duckbills are in use in Ohio and produce 15 percent of the mechanically loaded coal.

Various types of mobile loading machines, both track mounted and crawler mounted, are also in use, the Joy loader, which is crawler mounted, and the Jeffrey, Goodman and Myers Whaley, track mounted, are among the most popular types.

In response to the demands created by mechanization of loading, higher capacity cutting machines were required to speed up cutting and to provide flexibility to meet higher production schedules. Universal cutters, with track, crawler or pneumatic tire mounting, were developed to fill this need and their use has adequately met all requirements for accelerated loading by mechanical devices.

Trend Towards Mechanization

The following table shows the trend towards mechanization in Ohio and how it compares with mechanization nationally:

Percentage of Underground Bituminous Coal Mechanically Loaded
(U. S. Bureau of Mines)

Year	Ohio	All Other States
1928	4.9	4.9
1929	...	7.9
1930	...	10.9
1931	6.5	9.1
1932	6.5	9.0
1933	5.5	8.3
1934	5.8	8.7
1935	7.8	11.6
1936	9.5	14.1
1937	14.1	17.6
1938	24.1	23.4
1939	33.6	24.3
1940	46.5	30.1
1941	54.3	33.0
1942	65.9	36.4
1943	67.3	40.1
1944	65.1	44.0

These figures indicate that there was, for some years, a tendency in Ohio to lag behind the coal industry in mechanization, but that this lag has entirely been made up by the acceleration in recent years. By 1938 Ohio reached the national average in percent of coal mechanically loaded; since then it has exceeded that figure.

Mechanical Preparation

Many things have happened in coal preparation in the past 25 years; the old bar screens have been replaced by shakers and various types of vibrators. Much of the tonnage produced is still cleaned on hand picking tables but mechanical cleaning plants are increasing very rapidly, although during the war period, labor and material problems slowed this development to some extent.

In 1944 approximately 25 percent of the bituminous tonnage of the United States was prepared by mechanical cleaning plants; Alabama had 74 percent, Washington 88 percent, Illinois and Indiana 41 percent, Pennsylvania 25.5 percent, West Virginia and Virginia 19.8 percent; Ohio was slightly below the country's average having approximately 21.9 percent of the state tonnage cleaned mechanically.

The wet cleaning process appears the most popular; of the plants in the United States, approximately 82 percent use wet cleaning, approximately 7 percent use dry methods, and 11 percent combine both treatments.

Ventilation and Safety

Twenty-five years ago mines were still operating in Ohio that were ventilated by natural means, aided by a high stack built on the outlet opening. In some cases there was a fire basket placed at the bottom of the stack in which a fire was kept burning to aid in the updraft, which in turn speeded up the circulation of air in the workings. This is obsolete today and many types of power driven fans are now used, up to the modern airplane-propeller type.

Ventilating doors inside the mines have been largely replaced by overcasts, undercasts and automatic doors. The old continuous circuit method of air passage has been replaced by split systems which allow fresh air currents to be provided for different sections of the mines. The use of air shafts and slopes close to the working areas has simplified the methods of getting air into the faces.

Rock dusting has been introduced to reduce the danger of explosions of coal dust. Rock dusting of all areas in the mines is carried on by means of low pressure and high pressure rock dusting machines; there are also applications by hand in areas close to the working faces. Water, both treated and untreated, is being used to allay coal dust; this is sometimes brought into the mine through bore holes, sometimes hauled by use of tank cars. Pressure pumps and gravity feed water systems are used to apply water on cutter bars and loading machines, as well as for sprinkling at dumping points and on top of loaded cars and on roadways.

As another safety step, blasting has moved up from common granular black powder to the most modern permissible powders, Cardox and high pressure air and water methods of blasting. Detonation of blasting materials has progressed from the old sulphur squib and fuse to the approved electric detonators now used.

This paper does not cover the progress in strip mining. There has been a great trend towards strip mining in some fields and statistics for the year 1944 show that 23.3 percent of the coal mined in Ohio was from open pit operations.

The granddaddy of mine locomotives—in the late '80s

Copper deposits similar to Inspiration may exist beneath valley fill

Whence Our Future Ore Reserves?

By GEORGE M. FOWLER
Mining Geologist
Joplin, Mo.

The Days of Accidental Ore Discovery Are Gone and a More Scientific and Systematic Approach Will be Required to Locate Our Future Mineral Deposits

THIS paper is confined to copper, lead, zinc, gold and silver as they occur singly or in various combinations in the ores in many mines throughout the United States. Periodical appraisals of our mineral resources are essential for intelligent planning and government agencies and individuals have published such appraisals at intervals for many years. Past surveys refer almost entirely to ore deposits in some stage of development. Undoubtedly many new important discoveries will be made outside established districts and in them beyond the inferred extensions of known orebodies. Numerous small to very large areas in many parts of the United States where little or no work has been done must be explored for their ore possibilities. These areas are exclusive of even larger tracts where sufficient geological work has been done to demonstrate that only negative results can be expected.

An outline of this paper was presented at the Western Mining Conference held at Denver, Colo., in January, 1946.

Decline of Reserves

Before World War II the reserves of some of our common minerals, such as lead and zinc, were thought to be ample for our needs for many years, but recent surveys indicate their alarming decline. Many factors contributed to this situation. The volumes of these ores were adequate for current needs and there was little incentive from any source to augment them.

Few mining companies deemed it necessary to stimulate their ore search efforts until the recent war demonstrated the urgent necessity for metals. Many vigorous prospecting campaigns are now in progress and it seems certain that some of them will be successful.

The major production of the minerals mentioned above, from the beginning of the domestic industry to the present, came from relatively few districts. For several decades more than 90 per cent of their production came from less than 40 districts, nearly all of which will continue for many years to be important sources of mineral wealth. Also, numerous new ore discoveries will be made in these districts as few have been explored to their lateral and vertical limits.

Geological Data Inadequate

Among recognized essentials for hypogene ore deposition are:

(a) Source material;
(b) Channelways through which the source material may travel; and
(c) Reservoirs in which this material may be deposited.

Modern prospecting may disclose more zinc deposits in Eastern States

The adequacy or inadequacy of any of these essentials is a definite limiting factor in any ore deposit. The volumes of the deposits are directly related to the quantities of the source materials and the cubical contents of the ore reservoirs. The optimum conditions require abundant source materials, adequate channelways, and favorable host conditions.

The close relationship of hypogene ore deposits to structural deformation has long been recognized. All the major mining districts are localized in favorable zones in large centers of regional disturbance. This is also true where the host formations are all igneous, all sedimentary, and, in many cases a combination of both.

A little progress has been made in determining the reasons for the localizations of some of the mining districts as units, but much additional factual evidence is necessary. The three-dimensioned structural patterns within some mining districts have been determined with sufficient accuracy to delineate many of the important orebodies. Practically nothing is known regarding the structural relations that may exist between two or more districts. Serious studies to this end should be undertaken in many parts of the country. Partial to complete answers regarding these conditions would materially increase our ore reserves and our knowledge regarding ore deposits.

Prospecting of Concealed Deposits

Nearly all the past ore discoveries resulted from surface observations and prospecting of visible outcrops. New ore discoveries will show few if any surface manifestations and many of these deposits are concealed by barren formations from a few feet to many hundred feet in thickness. To date only limited attempts have been made to find concealed deposits. The oil industry faced a similar situation a few years ago, then new methods and new instruments were developed and we again have substantial oil reserves. Can the mining industry make similar progress?

In the revived ore search campaign surface exposures or manifestations that may indicate ore at depth are being reappraised in the light of present knowledge. Zones of structural deformation, stratigraphy, and rock formations in general and in detail are being studied with renewed emphasis. Soil analyses have been tried extensively in some areas and will have a place in future investigation.

Drilling and Geophysics

In some parts of the country where surface exposures are non-existent, churn or diamond drilling campaigns have been in progress for years. The stratigraphy is determined from drill cuttings or cores and structure contour maps are prepared and interpreted in order to delineate orebodies that may exist there. This work is being extended to many new areas in which little or nothing is known regarding the ore possibilities. Geophysical prospecting has given valuable preliminary information in some mining localities and it is probable that it will gradually be extended in the search for these hidden ores.

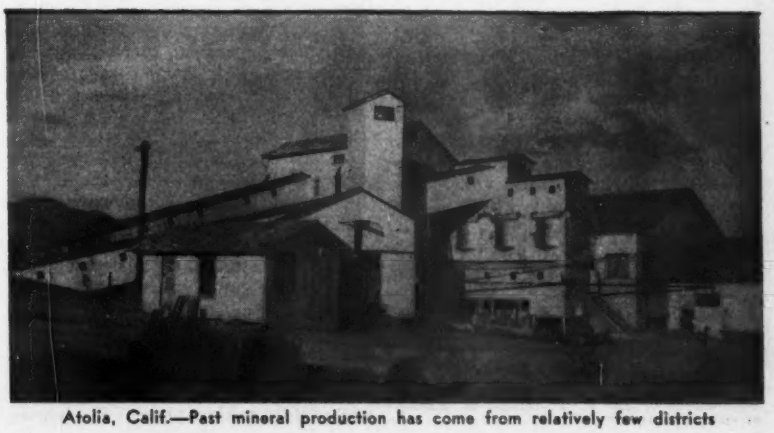
Fertile fields for prospecting for concealed ores at relatively shallow depths include large areas in the Mississippi Valley, areas in the eastern states, and parts of many of the intermountain valleys in the western states. Clues regarding hidden ore deposits in the western valleys may be revealed in some cases by interpreting the geologic structure and strata of the exposed contiguous mountainsides.

Need for Systematic Prospecting

The search for ore in the past in many cases, has been a hit or miss proposition with few organized plans except in the known districts. Nearly all the important ore discoveries were made by prospectors or by accident. The U. S. Geological Survey and a few State surveys have pioneered in general geological studies in many parts of the country and contributed valuable data, but their funds and personnel have been too limited to undertake intensive ore search campaigns.

For several decades technically trained personnels in the established districts have made remarkable strides in outlining development which has yielded large returns in ore reserves.

Few of them have undertaken real prospecting campaigns in regions outside these districts. Can anyone say that some of our common ores are now nearing exhaustion when vast potential areas have never been prospected? The successful investigators of the future who will work in these regions will be much better prepared as they will combine the efforts of the geologists, geophysicists, geochemists, and all others who are interested in ore deposits. When the new techniques are intensively and extensively applied throughout the country, undoubtedly many important ore discoveries will result.



Atolia, Calif.—Past mineral production has come from relatively few districts

Economic Problems Of The Coal Industry

An Analysis of the Factors That Have Been Disturbing in Connection with the Production and Marketing of Coal and a Discussion of the Economic Behavior Likely to Arise in Future Years

By G. A. LAMB

Assistant Director
U. S. Bureau of Mines

THE American coal industry is looking forward to better peacetime conditions than it experienced during the decade prior to World War II. Estimators are busy in establishing that the bituminous coal market will exceed 500,000,000 tons, and sometimes may approach 600,000,000 tons in the future years. Some predictions have better than 50,000,000 tons for the anthracite market.

Moreover, it is to be expected that the coal industry has confidence in its future after its amazing performance during the recent war. It was not discouraged by unheard of demands for solid fuels while manpower was dwindling and other difficulties arose. Instead, operators, miners, and sellers coordinated efforts to amass all-time records in providing an adequate supply of coal for war and civilian needs.

In spite of new and greater opportunities during peacetime, however, coal is likely to encounter serious problems. Most observers will agree upon this point. Coal is of such a character as to create problems. A majority of these are traced to a queer economic behavior found in the industry which appears in various forms but which has a common expression—ruinous competition and a declining price level. The proved ability of the industry to meet difficulties will be severely tested in the handling of these future problems.

An analysis of probable economic problems of the coal industry does not have to be theoretical or highly speculative. Events over a long period of time take too prominent a place in coal history to be ignored or forgotten. The destruction that was caused by economic forces in the twenties and thirties has not been entirely erased. These forces were inactive during wartime. Then coal and practically everything were regulated in terms of military objectives. The forces still remain, however. They are but waiting to make their challenge when the opportune time arrives.

Nor have the effects of these forces been limited to America. They have made their appearance in every country where coal production is of any consequence. Many attempts have been made to curb them. As a result, the coal industry over the globe probably has experimented with more kinds of control—both government and private—than any other major industry. One thing is certain. There is no universal agreement on how to curb these forces and experimentation continues throughout the world.

It is neither the intention to discuss the merits of coal controls nor to sponsor controls by government or private organizations. Reference only is made to the fact that the involved set of economic conditions attributed to the coal industry has presented a series of difficulties that inevitably have led to some sort of control. Before World War II, over 90 per cent of the world's production was subject to price control, and well over half of the production was subject to output quotas, sales quotas, or both.[1] In Europe, besides government ownership and operation, there were coal controls ranging from the cartels of Germany to the supervised schemes of Great Britain. Outside of Europe, there was the marketing agency plan in South Africa and a monopoly arrangement in Japan. In the United States there was a temporary minimum price law applicable to bituminous coal, and an allocation plan under state guidance in development for Pennsylvania anthracite. What is the situation today? America still has the strings of wartime regulation stretching into the reconversion period but no peacetime program has been outlined. But in other places changes are rapidly taking place. Tendencies abroad are towards stricter controls with countries like Great Britain and France going over to nationalization. The tendency towards nationalization is disturbing but not likely to appear in America. Nationalization where established includes not only the controls over the coal market but is designed to satisfy political and other considerations which are not in evidence in this country and which we hope to avoid. In the circumstances, it has nothing to commend it but it does have features from our standpoint that condemn it.

With the American coal industry entering into a new period of peacetime operations, prospective economics becomes of paramount importance. It is essential that there be a minimum of economic disturbance and a maximum of opportunity. How to do this is a complex task of great magnitude as indicated by an outline of the economic conditions. What are the economic factors to be evaluated? First, a glance at trends for background purposes. (See Fig. 1.)

Trends and Deficits

Until World War I, the market for coal expanded almost year by year. Between 1900 and 1918, the production of bituminous coal increased from 212 million to 579 million tons, anthracite from 57 million to 99 million tons.[2] Conditions were such that, although there might be temporary slumps, the coal industry could look ahead to a bigger market. The continual rise in coal requirements did not permit certain economic conditions to develop as they were to develop later.

After the war, the coal industry underwent a significant change. At first, it hid behind a prosperous appearance. Investors were anxious to

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Presented before the Annual Coal Convention, American Mining Congress, April 29, 1946, and published by permission of the director of the U. S. Bureau of Mines.

[1] Report of the International Labor Office: Technical Tripartite Meeting on the Coal Mining Industry, 1938; Part 1, Economic Conditions.

[2] Figures used in this paper are taken from publications of the U. S. Bureau of Mines, except as otherwise indicated.

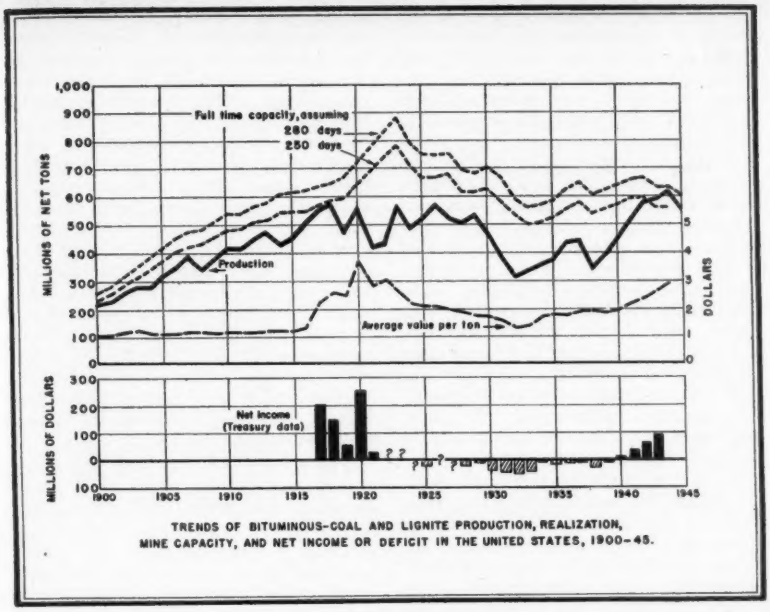


Figure 1

enter the business when prices were pushed to record heights because of tonnage limitations due to car shortages, railroad strikes, and coal suspensions. Mining capacity advanced to a peak level and far beyond anything necessary to meet requirements. Simultaneously not only did the market fail to expand but there were indications of elements that were to start its decline. New burning techniques and other fuels were introduced in earnest and progressively exerted their influence to keep coal consumption down. By 1924, the settings were complete for a competitive warfare and the inevitable price cutting. Both were under way with great vigor. Liquidation began. The coal industry was to be in a depression—first bituminous, then anthracite — while business in general was enjoying the prosperous twenties.

The coal industry did not really get out of its depression until World War II was on the horizon. Money was lost steadily in the bituminous industry from the middle twenties up to 1940 when minimum prices were made effective. It is true that, during the thirties, annual bituminous production never reached 500 million tons, and it was less than 400 million tons during the majority of years in that decade. But even in the better years of production, economic forces would not react to permit the industry a profit. Nor were the controls, exercised temporarily under NRA, successful in the profit aspect although they provided certain improvements. By 1940, anthracite had but half the market it once enjoyed. Deficits in the thirties were severe. Capacity had been liquidated almost accordingly. (See Fig. 2.)

Experiences between the two world wars illustrate the effects of the queer economic behavior with which the coal industry has to contend. They are not to be viewed as having occurred because of a single group of happenings that will not appear again. True, the developments after World War I were unfortunate but their effect merely was to quicken the speed of activities that cause ruinous competition. Conditions that make for a disastrous market during peacetime are well known to the coal man. They will be summarized with regard to coal generally and not to particularized situations.

The Peculiarities of Economics

Excess capacity goes along with American coal mining. Unlike some countries, America is bothered sometimes by producing too well rather than too little. Coal consumption varies by years and by seasons. The consumers like to take the coal when they need it, and producers aim to satisfy them. Producers always seem able to have reserve capacity for peak years, and for the seasonal increase in requirements during the colder months. This means that there is a surplus of manpower and plant in certain years as well as in certain months of every year. In addition, there are continued improvements in mining methods through mechanization and new techniques. These improvements are desirable and to be supported but they do add to capacity at least until they displace other types of operations. There has been excess mining capacity in the coal industry in every year for which records are available except in a portion of World War II. Present output records indicate there will be an excess of capacity in future years. In other words, more coal can be produced than will be needed during any part of some years and during the warmer months of others. Every effort will be made individually to sell all the coal that can be mined because of the

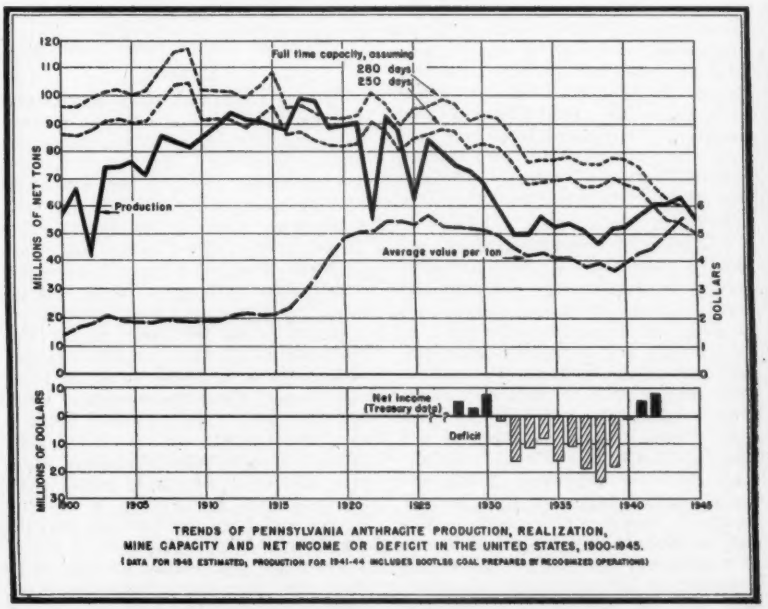

Full time capacity, assuming
280 days
250 days
Production
Average value per ton
MILLIONS OF NET TONS
DOLLARS
Net income
(Treasury data)
Deficit
MILLIONS OF DOLLARS
TRENDS OF PENNSYLVANIA ANTHRACITE PRODUCTION, REALIZATION,
MINE CAPACITY AND NET INCOME OR DEFICIT IN THE UNITED STATES, 1900-1945.
(DATA FOR 1945 ESTIMATED; PRODUCTION FOR 1941-44 INCLUDES BOOTLEG COAL PREPARED BY RECOGNIZED OPERATIONS)

Figure 2

operating cost advantages that are reflected in volume and steadiness of output.

In addition to excess capacity there is another characteristic which encourages cutthroat competition. It is the joint product aspect that develops in connection with coal preparation.

There are many kinds and grades, and hundreds of sizes, which make coal appear on the market not as one but as many commodities. Coal is offered in these shapes and forms to satisfy the complex use pattern of consumers. Unless production and preparation are planned in accordance with the varying desires of consumers, there may be shortages or overages in coals and sizes. Overages are the rule as long as excess capacity exists. This leads to the joint product problem found in preparation. If a large size is screened, a smaller size must result. There may be a wide price spread between sizes but it is the expectation that the return from all sales will be above or at least equal to total costs. Oftentimes a resultant does not have a ready market. Generally it cannot be stored economically by the producer. It is better to obtain some price for it than throw it away. There is always the hope that good prices will prevail on other tonnage. Markets are explored for a sale. One "no bill" car of resultants may be offered many times, and it assumes the appearance of 50 or maybe 100 cars before long. Finally, it may be dumped on a market at a price lower than going quotations, and to the disadvantage of companies that ordinarily serve the market. This simplified case is multiplied many times and the situation becomes highly involved. At the same time, some producers may screen primarily for small sizes, and may be long on large sizes if they fail to have crushers. Hence, the price structure is attacked from all angles. One dumping small sizes as he depends on large size sales may find dumping in his markets against his main product. The general effect is to push the price level downward.

Besides the excess capacity and joint product aspects, there are other factors common to the coal industry that encourage strenuous competition. Tonnage is mined in all sections of the country and is distributed widely and over long distances by rail, or some combination of rail with truck, river barges, lake and tidewater vessels. There are few markets of any size that fail to obtain coal from several distantly separated fields and many markets take coal from a half-dozen or more mining areas. Not only is coal the largest single source of freight revenue and its movement promoted by the transportation interests, but coal companies continually are seeking new or enlarged markets and are willing to fight if there is any threat of losing what they have.

The American coal industry is composed of thousands of companies scattered over 30 states. Many sectional views, interests, and customs, are represented. Other major industries have a different set-up. Through years of competition and adjustment, units of the other industries have been combined into a relatively few companies where leadership is understood if not formalized. This often has been the case where originally there were many units and competition was severe. But not in the case of coal. The coal industry has had more than its share of competition and liquidation but continues to have thousands of companies. Conditions that favor this multi-unit set-up are likely to remain. Unlike some other industries, coal does not require large capital outlays for entrance into the business and size in itself does not furnish advantages in the production end. As long as mining can be entered without restriction, many companies will be willing to extend their facilities and new concerns will be available and eager to try their chances in the mining game. Similarly, one company may abandon operations but another is ready to take over. Mines remain whether or not the companies do. Marketing agencies, sales agents, and similar kinds of organizations, have been successful in combining the sales phases of many established mines, but have had more limited effect on production. These organizations have provided improvements but they have not been extensive enough to effect orderly mining and marketing activities by which to avoid the principal price difficulties.

Mining Costs and Selling Prices

Mining costs and hence profits and deficits vary widely. In the bituminous coal industry, commercial mines had a price level that was 15 cents per ton below costs in pre-war 1938, and 11 cents above costs in the war year 1942. During the earlier year, 70 per cent of the tonnage had a return that was less than costs. Sizable losses were suffered in many operations but there also were substantial margins among the fewer mines that operated at a profit. In 1942, 75 per cent of the tonnage had a return at or above costs, about the reverse of 1938. Margins above costs ranged from 1 cent to over $1 per ton. It is obvious that companies with good margins are in a favorable position to lower prices if there is a market threat, and they will quickly, though reluctantly, take such action to maintain volume and protect accounts. It does not take many quotations to start a competitive scrimmage and the downward price spiral.

Coal does not have to depend upon the characteristics of its own industry for the competitive urge; there also is the ever ready challenge from other fuels. The intensive competition that already is characteristic of the coal industry within its own framework receives a broadening and acceleration from petroleum and natural gas, and even from wood in some markets. Fuel oil and natural gas, marketed by comparatively few concerns, often are in a position to make strong bids for attractive business. Naturally, if coal reduces its price to protect a large account from these competitors, it is not long before other accounts clamor for similar reductions with threats to change their fuel. Once price decreases start, they can spread rapidly.

The driving down of delivered price is reflected directly in the mine price. Between market and mine prices, the difference is represented largely or entirely by transportation costs which are fixed in the main. The producer must depend upon the market for his price and he has to sell in relation to that price to move coal even though he loses money. Market interests are in the lowest prices and they have no regard for mining costs. In turn, the producers costs are mostly fixed. Wages make the largest item, about 60 percent of the total mine costs. Naturally, it is an item under pressure when mine realization is poor, a reason why a strong wage scale is in effect. Payrolls must be met currently. Taxes other than income taxes, and insurance, are 6 percent of total costs. Supplies including power purchased, run 17 percent. Items like depreciation, royalties, and depletion, may be ignored for a period but they are only 9 percent of total costs. Similarly, some of the remaining items in administrative and selling expenses can be overlooked temporarily. Eighty-five percent or something more of total costs currently have to be covered by cash. Arrears on the remaining items may accumulate as a growing burden that will demand its day of reckoning.

History shows that prices can be driven below cost indefinitely for particular mines and for the industry as a whole. Deficits of the bituminous coal industry between 1925 and 1940 furnish a good example. Without an opportunity to make a reasonable profit, the industry cannot be a healthy part of the American economy; it cannot develop and grow as it should. Deficits mean that the industry is forced to take a negative outlook, to liquidate to pay its obligations. They imply careless operations and irresponsible transactions, anything to permit survival. Everyone is hurt; investors, operators, miners, and the public. Irreplaceable coal is wasted.

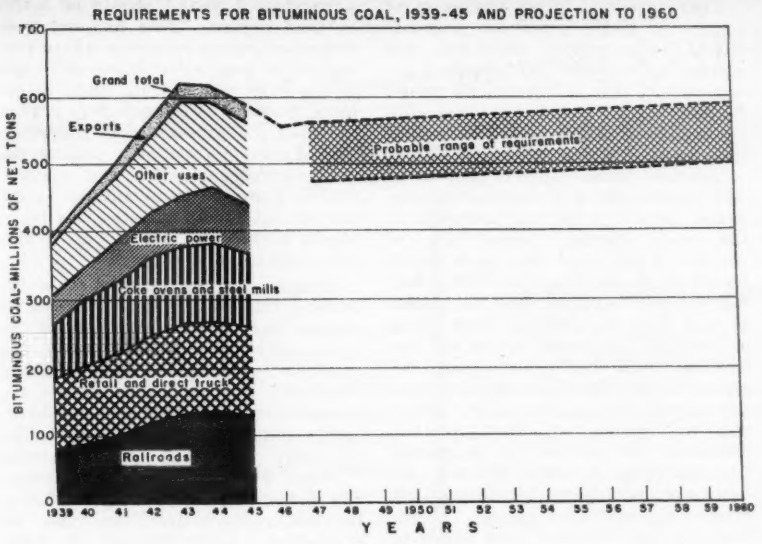


Figure 3

Future Conditions

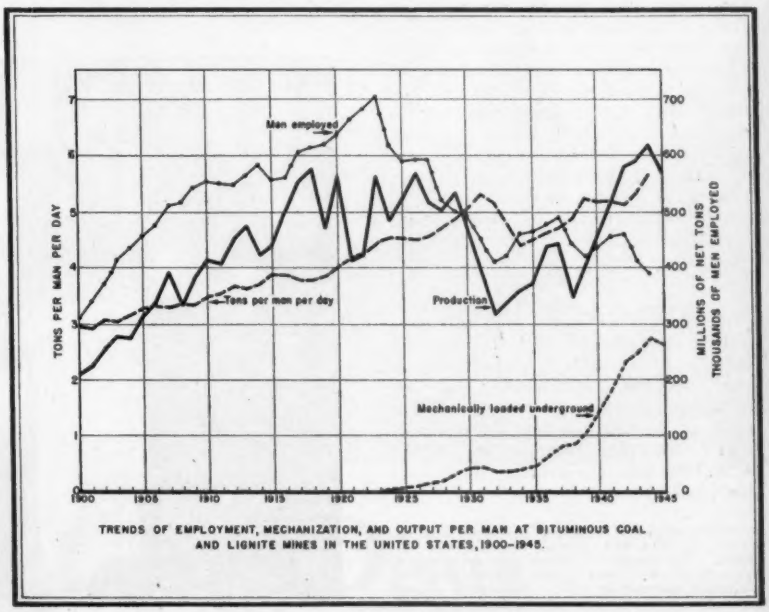
What are to be the probable conditions in the coal industry when the transition to peacetime operations takes place? What will be the economic reaction? (See Fig. 3.)

American bituminous coal will have a more favorable market than it had before the recent war. Forecasters believe that annual requirements will average more than 500 million tons during the next 15 years.[3] They assume the country will have general business activity at a high level in order to keep financially stable and avoid heavy unemployment. Still, it is estimated that requirements will not reach the 1943 war record of 621 million tons. For example, it is believed that if activity is full enough to provide practical full employment in 1950, bituminous coal needs would not exceed 565 million tons. Estimates for the next 15 years allow no substantial tonnage for synthetic oil nor take account of displacement by atomic energy. They do allow, however, for advances in utilization technology and for inroads by existing competitive fuels. Anthracite, mostly a heating fuel, does not enjoy the peacetime outlook of bituminous, particularly in view of its costs and threats from other fuels. The anthracite industry hopes it can maintain an annual market of at least 50 millions, comparable to what it had in the late thirties.

Excess mining capacity which invites ruinous competition has many things in its favor for development after the reconversion period. Bituminous production was in excess of 13 million tons in 4 weeks of this year's first quarter. It amounted to 57 million tons during March, the largest output for a single calendar month since 1927. It is true that this production was obtained with a 54-hour work week but, on the other hand, with 80 thousand fewer miners than were on the payrolls as an average for the year 1942. Miners lost to military service and other industries during the war have been steadily returning more recently, and will continue to do so in future months. Mining technology is advancing. At the same time, requirement levels will be under those of the war. These conditions are making for capacity and when stimulated by the cyclical and seasonal aspects, the tendency will be to broaden operations well beyond those needed. Excess capacity may be absent during the coming year when scarcities still prevail but it will have all the favorable conditions for appearance as soon as ordinary peacetime operations can be resumed. The proportion of surplus capacity in anthracite will be less than in bituminous. (See Fig. 4.)

Also to be present in future years will be the joint product aspect involved in coal preparation. The market for kinds and sizes will be as complex as ever. There will be thousands of producing units with varying costs, distributing coal over wide areas seeking to expand as well as maintain markets.

Improvements will take place in burning techniques although present indications are that they will develop less rapidly than they did after World War I. In 1939 as compared with 1919, the railroads used one-third less coal per ton-mile; the electric utilities less than half as much coal per kilowatt-hour; the steel companies one-fifth less coal per ton of pig. Efficiency developments as indicated by these figures cut heavily into coal consumption during the twenties and thirties but also had the effect of reducing the cost of coal to the consumer and of giving coal a better position in the competition with other fuels. Advances in fuel technology will mean that less coal will be used relatively but that the chances to maintain markets will be better. At the same time, they can cause disturbances in the production and selling of coal if the industry is not equipped to absorb them.



TRENDS OF EMPLOYMENT, MECHANIZATION, AND OUTPUT PER MAN AT BITUMINOUS COAL AND LIGNITE MINES IN THE UNITED STATES, 1900-1945.

Figure 4

[3] For example, see Postwar Requirements for Bituminous Coal, a preliminary report by Glen L. Parker and J. J. Gallagher, United States Bureau of Mines.

Oil and Gas Competition

Oil and natural gas competition will be severe, at least until there are more definite limitations on the reserves of these fuels. Some say that in the retail market the real competition will be between oil and natural gas, and that coal will not be a principal factor in new business. This statement may be a little broad for general acceptance but it does have support in particular instances. Experts in the power field are optimistic about future chances of electricity for heating purposes which might be to the advantage of coal because of its importance in generation.

Requirements for fuels of all kinds were of record proportions during the recent war. Market price often was of secondary importance to the consumer. Coal increased its sales sharply even though substantial advances were made in prices. These price advances were occasioned largely by cost increases due to overtime operations effected to offset manpower shortages while meeting the heavy requirements. An average bituminous mine price of $2.19 per ton in 1941 had advanced nearly $1 by the end of the war, or approximately 40 percent. Anthracite of $4.26 per ton in 1941 jumped nearly $2 in the same period, also 40 per cent.[4]

There were limitations on fuel oil during the war and it had a slight loss in its relative market position. Although there is a problem of increasing its supply, it is eager to regain its former prominence and branch out additionally. Natural gas was able to expand noticeably and it has the resources to do so in the future. An important thing to note, however, is that since 1941 the refinery price on fuel oil has had less than one-fifth of the relative price increase on coal. The delivered price on natural gas did not change measurably through the war except for a slight tendency to decrease after 1943. Thus, the price relationships between coal, oil, and gas changed radically during the war, and to the disadvantage of coal. Unless it can reduce its prices, coal stands to lose a sizeable portion of its market.

What is to Be Done?

It is clear that conditions are to be such as to invite destructive competition once the coal industry assumes ordinary peacetime proportions. What must be done to prevent the destructive forces from operating and at the same time keep the industry on an efficient basis?

There are two broad phases to be considered in the peacetime program. First, is the orderly production and marketing of coal. It provides the opportunity for a reasonable profit. Second, is activity towards lower mining and utilization costs, and additional uses for coal.

The first phase—orderly production and marketing—will require the integrated action of the coal industry in the public interest. Some form of control is the only way such action has been obtained, and no better way has yet been demonstrated regardless of how little it is liked. It has been proved that integrated action will not develop from the spontaneous response of individuals, each acting independently and as he sees fit. There must be a general approach since the problems are general in character. The individual, guided by his own outlook, is vulnerable to the forces that feature the cutthroat market. Therefore, the coal industry must resort to controls to protect itself.

Controls may be voluntary (if legally possible) or through the Government, or both, but whatever the form they must encourage and not impede advancement. This brings up the second phase. Their purpose should be to furnish the coal industry generally with stability and the opportunity of a return, but guarantee nothing to any individual. In other words, individual initiative is not to be lost. The aim of the controls is to arrest the forces that cause disintegration of the industry. It does not have to be of wider application. Competition need not be eliminated and its favorable influence on technological improvement need not be disturbed. Once it has stability and can enjoy the possibility of a fair return, the industry will be equipped to promote advancement and it should be active in that regard. This has not been the case in some countries where controls have been so inclusive and rigid as to have resulted in static situations. Stress was on monopoly profits, the need for progress was forgotten. These countries are now paying the price of reorganization and modernization, and face disadvantages in the market. A static industry can be in poorer shape than one in which ruinous competition prevails.

Progress in the techniques is extremely important. Relative costs of production and utilization must be continually lowered both from the standpoints of the industry and the economy. Further improvements are essential in mining through mechanization and other means. Costs to the consumer must be reduced also through greater burning efficiency. The more recent emphasis on coal as a furnisher of commodities can be broadened. Improvements of these kinds are prompted not only by the competition of other fuels, but also by the fact the coal industry can make definite contributions to expansions in the American economy.

The American coal industry is huge and important. Not only does it represent a large investment and the livelihood for hundreds of thousands of persons, but it is an integral part of our economy. It is the main source of energy and the provider of basic products. Its efficient operation is of national interest. Therefore, the coal industry has a great responsibility in formulating its peacetime program and in carrying it into operation. It cannot afford to fail on this assignment and, judging from past accomplishments, it does not lack the necessaries for making good.

Synthetic gasoline may become an economic factor in coal's future

[4] Costs advanced at above the same rate as prices, as OPA had effective controls over returns. The margin of return, above costs for bituminous, was close to the 16 cents per ton standard specified by OPA. Anthracite return was less than its prescribed standard of 19 cents.

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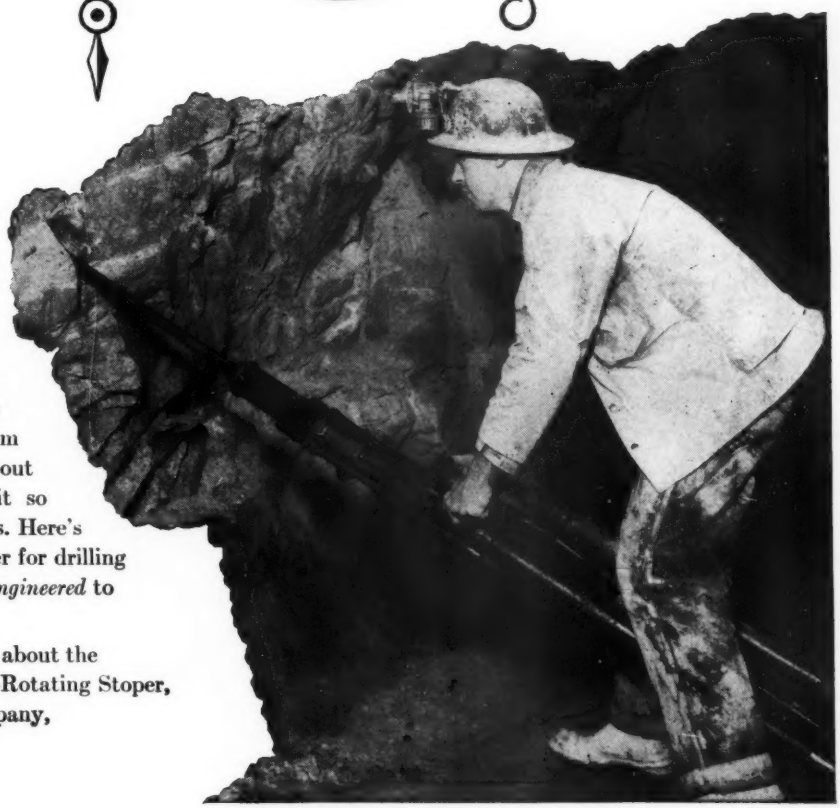

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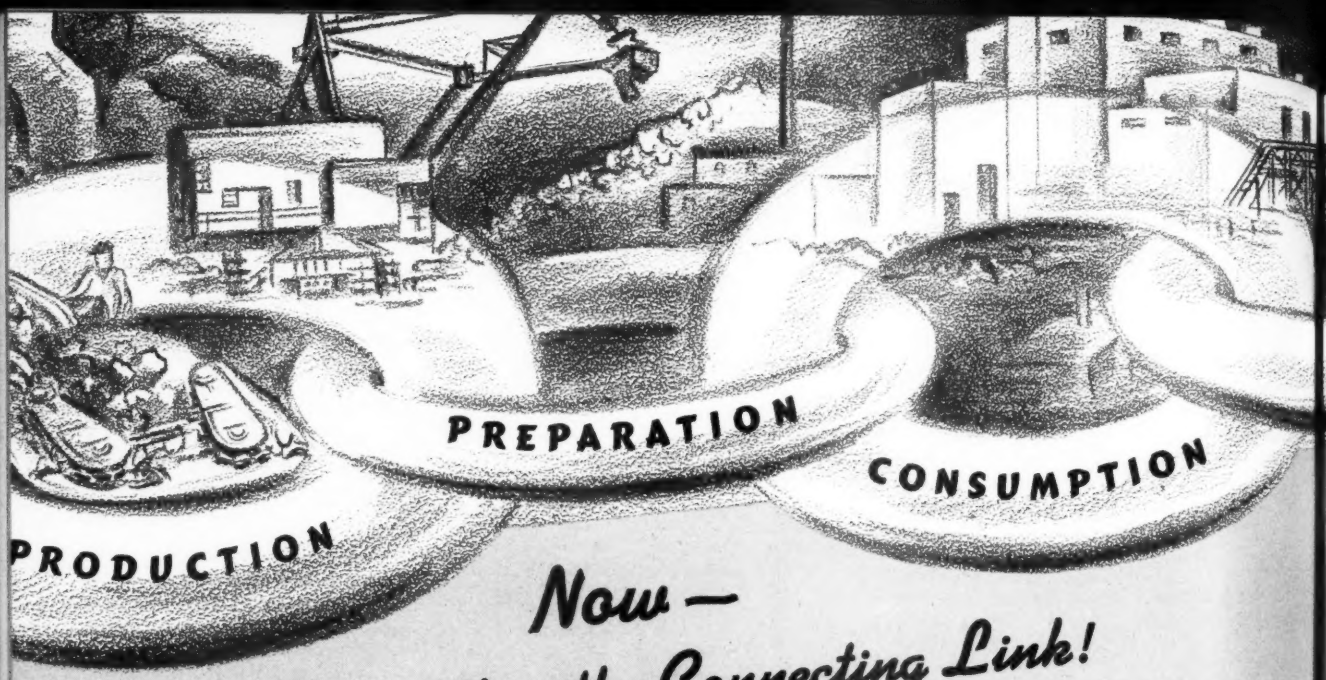

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As ensuing statistics so vividly portray, giant forward strides are being made in efficient mechanized-mining methods and equipment. Projected curves of mining efficiency indicate beyond question that an adequate supply of raw coal can be delivered above ground as economically as any unprocessed fuel.

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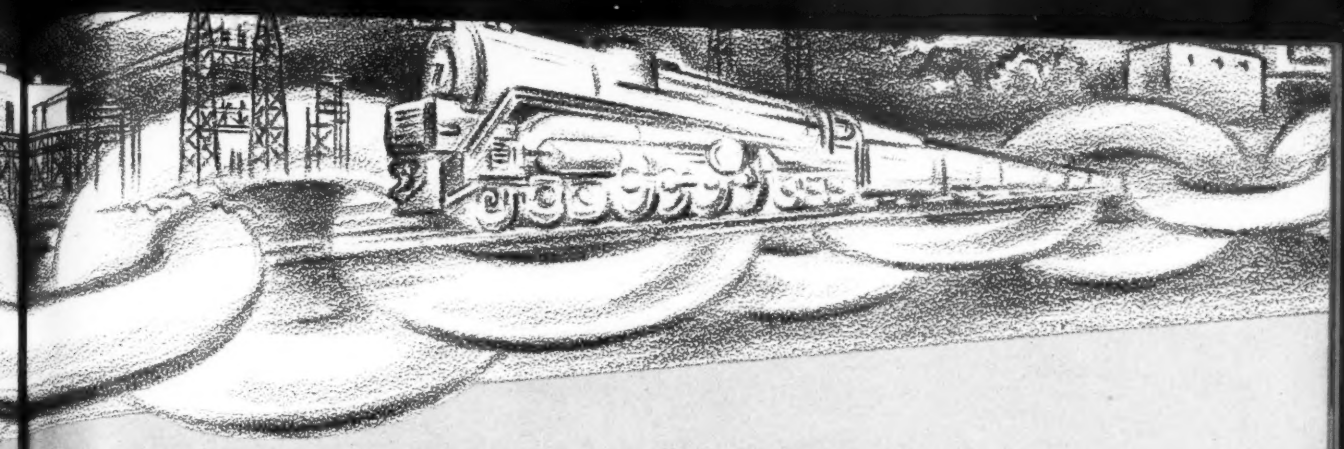
Between Production and Consumption is Preparation—greatest remaining opportunity for progress in product-quality that will make coal impregnable against substitute fuels in tomorrow's competitive markets.

In coal preparation, progress *has* been made. But the *rate of increased output of low-sulfur, low-ash coal is still less than the growth of mechanized mining and improved efficiency-of-use in coal's principal markets.* True, the output of many mines needs a minimum of preparation. But many have yet to achieve the most economical preparation of coal as physically and chemically uniform as any refinery's output!

AMERICAN CYANAMID COMPANY



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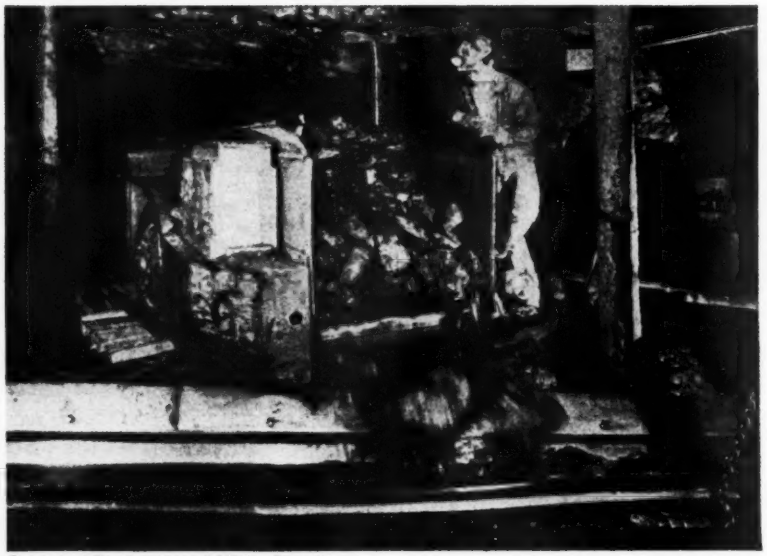

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ALKALINE BATTERIES

Alternating Current for Mine Transmission and Distribution

A Report of the Power Committee, Presenting a Series of Curves to Simplify the Designing of AC Underground Lines

By D. E. RENSHAW
Subcommittee Chairman

AN ADEQUATE power supply is one in which the generator, transformer, conversion, transmission and distribution equipment are all of correct design and capacity to deliver electric power to the motors in the quantity and at the voltage required for efficient operation. The relation of an adequate electric power supply to the successful operation of mines has frequently been discussed in THE MINING CONGRESS JOURNAL and in local and national meetings.

Power Line Design

Reports of the Underground Power Committee, published in THE MINING CONGRESS JOURNAL in May, June and October, 1941, contained data and instructions for selecting sizes of direct current trolley wire and positive and negative feeders to avoid overheating of conductors and to avoid excessive loss of voltage. The following report contains equivalent data and instructions for selecting conductor sizes and characteristics for a.c. power lines.

The problem of designing an alternating current power line is somewhat complex, because voltage drop is affected by:

1. Line voltage.
2. Load power factor.
3. Kilowatt load.
4. Length of line.
5. Conductor size.
6. Conductor spacing.
7. Allowable voltage drop.

It is the purpose of this report to simplify this problem by the use of curves which eliminate all calculations except simple arithmetic. Two sets of curves are presented: one set for use on aerial or overhead lines composed of three separate wires, and the other set for lines made up of three conductor cables.

These curves are sufficiently accurate for practical use on short lines up to a maximum length of 35,000 ft. They cannot have the accuracy of individual calculations because the curves cannot be read with extreme accuracy. But they have the merit of being easily used to obtain answers quickly.

In laying out a power line, the values of load, power factor, and voltage drop should be the values which establish the limits under which satisfactory results may be obtained. For example, a line feeding a synchronous motor generator set should be capable of carrying two times full load at unity power factor with not more than 10 per cent voltage drop.

All loads to be carried by the transmission and distribution lines are treated in terms of KW. If loads are known in terms of KVA or HP, they may be converted to KW by the following formulae:

KW=KVAxPF (Power factor as a decimal fraction).

KW=HPx.85 (based on motor efficiency of 88%).

Since power factor has such an important effect on voltage drop on a-c lines, the load power factor should be known or estimated with reasonable accuracy. In the absence of more specific data, the following values may be used at full rated load:

Induction Motors—.85 PF Lagging.

Rotary Converters—1.00 PF.

Ignitron Rectifiers—.93 PF Lagging.

Synchronous Motors—1.00 PF.

Synchronous Motors—.80 PF Leading.

Curves Showing Relation Between A.C. Line Factors

For the method of determining the *power factor* of a mixed load, refer to Example 1 and Fig. 1.

Curves Fig. 2 and Fig. 3 show the relations of conductor sizes, line voltage and power factor for a voltage drop of 1 per cent in the transmission line. The voltage drop of 1 per cent has been chosen, not because it is a typical or economical value, but because it is a convenient base point from which to work out the solution of problems.

On any specific transmission line, at a fixed voltage and a fixed power factor at the load, the line drop is directly proportional to the KW load. For example, if the load on a line is doubled, the voltage drop will be doubled.

Similarly, on any specific line, if the power factor and per cent voltage drop remain unchanged, the amount of power which can be transmitted is proportional to the square of the voltage. Or, if the power factor and load remain unchanged, the voltage drop is inversely proportional to the square of the voltage.

The application of these principles is shown in Examples 2, 3, 4, 5 and 6.

Voltages, in all cases, are voltages *at the load*, and voltage drops are given as a percentage of voltage *at the load*. The term KWD is the product of kilowatts times distance measured in thousands of feet.

The load KWD is fixed by operating conditions and is calculated as follows:

Load KWD=Load KW x D (in *thousands* of feet).

The line capacity KWD is variable depending on conductor size, conductor spacing, line voltage, power factor, and allowable voltage drop. All these variable factors except conductor spacing have been taken into consideration in drawing Curves Fig. 2 and 3.

These curves are based on an equivalent spacing of 34 in., which, in general is adequate for voltages up to 7,500 volts. It should be noted that conductors on a standard four

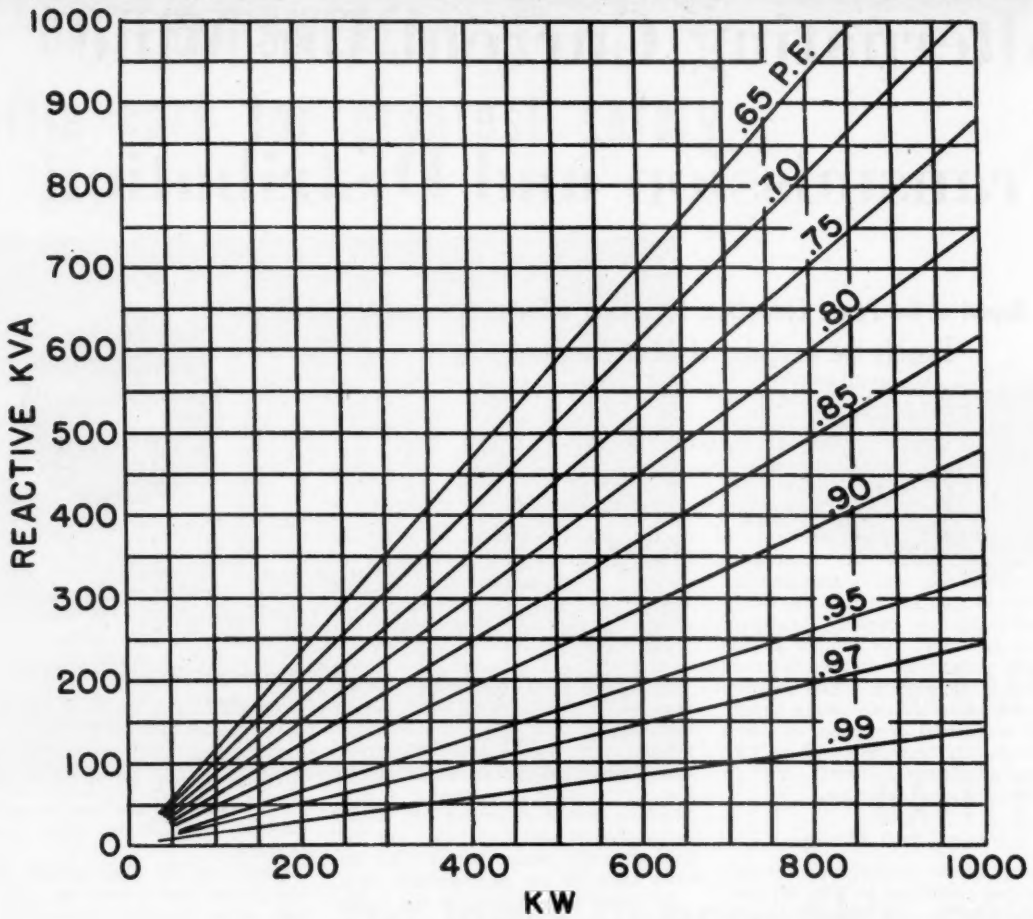

Fig. 1—Relation between KW and RKVA at various power factors

pin cross arm have an equivalent spacing of 34 in. For a spacing less than 34 in., the voltage drop will be slightly less than shown by the curves. For greater spacing, the voltage drop will be more.

Curves Fig. 2 and Fig. 3 are to be used principally for five purposes:

1. To determine the *size of conductor* which should be used on a proposed line to carry a specified load at a specified voltage, power factor and voltage drop. Refer to example 2.

2. To determine the *improvement in voltage* conditions which can be obtained as on existing line increasing the voltage, as from 2,300 to 4,000 volts. Refer to Example 3.

3. To determine the *voltage drop* on an existing line with an existing load, or if more load is added. Refer to Example 4.

4. To determine the amount of *power factor correction* required on an existing or proposed line to enable that line to carry a specified load at a specified voltage and voltage drop. Refer to Example 5.

5. To determine the *size of conductor* which should be used on a proposed line to carry a specified load at a specified power factor and voltage drop, at a line voltage not shown on the curve. Refer to Example 6.

Curve Fig. 4 is used to determine the *minimum size of conductor* which may be used to supply power to a specified load at a specified voltage, *without excessive temperature rise.* Except for short, low voltage lines, or very short, high voltage lines, the size of conductor will be governed by voltage drop rather than by conductor heating or current capacity. The procedure for use of Curve Fig. 4 is shown in Example 7.

Example 1. Power Factor

To determine *overall power factor* of a load consisting of

Load A—200 KW at .90 PF Leading.

Load B—700 KW at .85 PF Lagging.

Refer to Fig. 1.

Load A—200 KW RKVA= —97 Leading.

Load B—700 KW RKVA= +434 Lagging.

Total Load—900 KW net RKVA= +337 Lagging.

Draw horizontal line from 337 RKVA to intersect vertical line at 900 KW, and read:

PF=.94 approximately.

Example 2. Aerial Line

To determine *conductor size* to carry 300 KW at 2,300 volts, .85 power factor lagging, 9,000 ft. with a voltage drop not to exceed 10 per cent.

KWD at 10 per cent drop=300 x 9= 2,700 KWD.

Equivalent KWD at 1 per cent drop=2,700÷10=270 KWD.

On Fig. 2, start at 270 KWD on 2,300 volt scale at left, run horizontally to .85 power factor lagging, then vertically to first conductor curve. This curve, 1/0, is the conductor required.

Example 3. Aerial Line

To determine the *reduction in voltage drop* which will result from an increase in line voltage from 2,300 volts to 4,000 volts, with a fixed load of 300 KW at .85 power factor, dis-

tance 9,000 feet, conductor size 1/0, as determined in Example 2.

On Fig. 2 start at intersection of .85 lagging power factor line and 1/0 conductor curve, run horizontally to the 4,000 volt scale and read 830 KWD. This is the amount of power which can be carried with 1 per cent drop. Since the actual power required is 2,700 KWD, the actual drop will be

$$(2{,}700 \div 830) \times 1\% = 3.25\%$$

Note that increasing the voltage from 2,300 volts to 4,000 volts decreases the drop from approximately 10 per cent to 3.25 per cent, without change in conductor size.

Example 4. Aerial Line

To determine the *voltage drop* on an aerial line 12,000 ft. long, No. 2 copper conductors, with a load of 500 KW at .80 leading power factor and at 2,300 volts.

On Fig. 2 start at the intersection of the .80 leading power factor line with the No. 2 conductor curve, run horizontally to the 2,300 volt scale and read 635 KWD. This is the amount of power which can be carried with 1 per cent voltage drop. Since the actual power required is 500 x 12 or 6,000 KWD, the actual voltage drop will be

$$(6{,}000 \div 635) \times 1\% = 9.45\%.$$

Example 5. Aerial Line

To determine the amount of *power factor correction* required to obtain a *decrease in voltage drop* from 10 per cent to 7½ per cent with a load of 300 KW at 2,300 volts, .85 lagging power factor over a distance of 9,000 ft. with 1/0 conductor size, as determined in Example 2.

Under the new condition, the capacity of the line must be 2,700 KWD at 7½ per cent drop or $2{,}700 \div 7.5 = 360$ KWD at 1 per cent drop.

On Fig. 2, start at 360 on the 2,300 volt scale, run horizontally to intersect the 1/0 conductor curve. This intersection occurs at the .95 lagging power factor line, which indicates that the power factor at the load must be raised from .85 to .95.

To obtain a power factor of .95, capacitors must be added equal to the difference in RKVA at .85 and at .95.

Refer to Fig. 1.

At .85 PF 300 KW RKVA=185

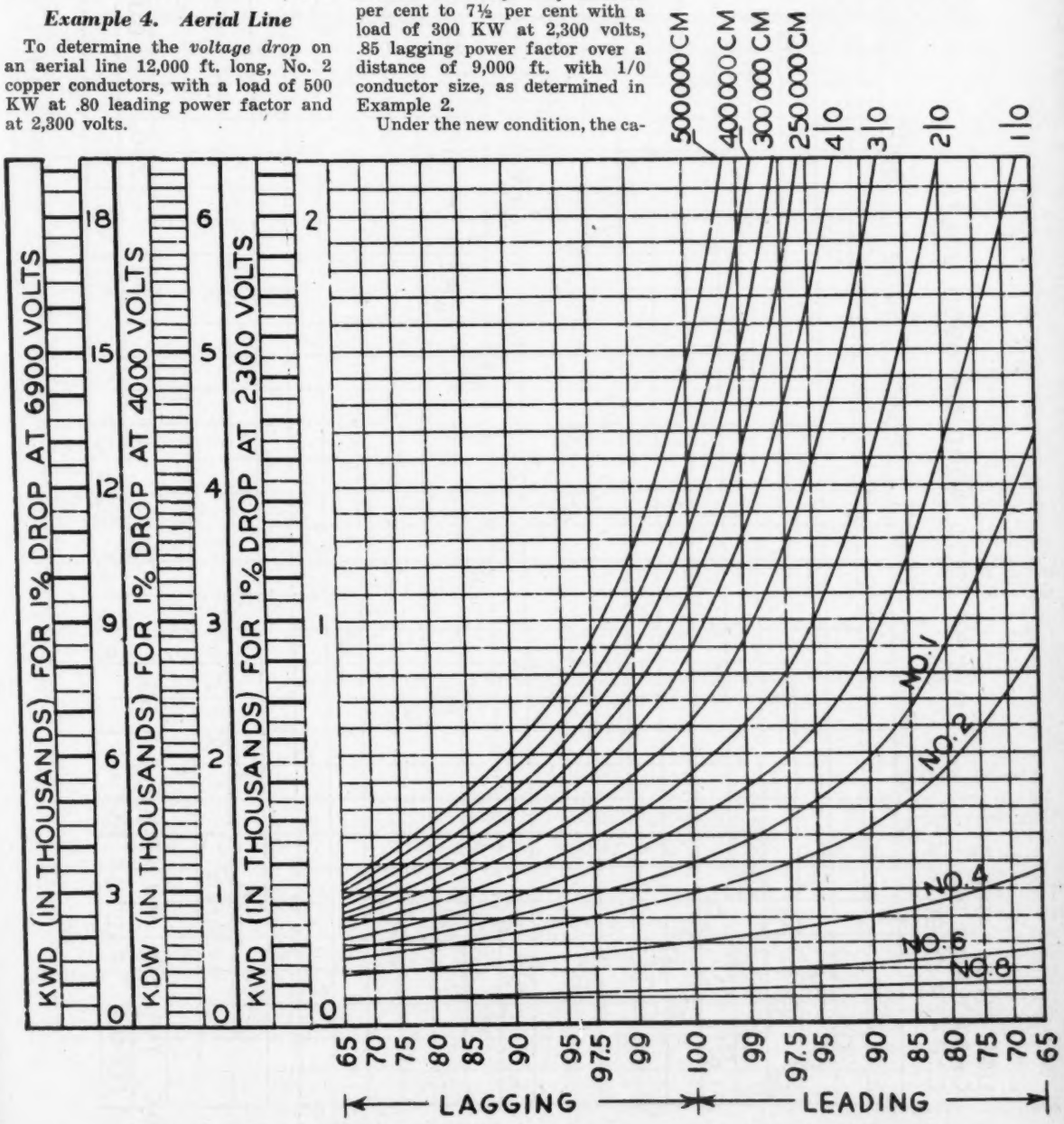

Fig. 2—Curve for determining voltage drop in 3 phase 60 cycle overhead lines, 34-in. equivalent spacing

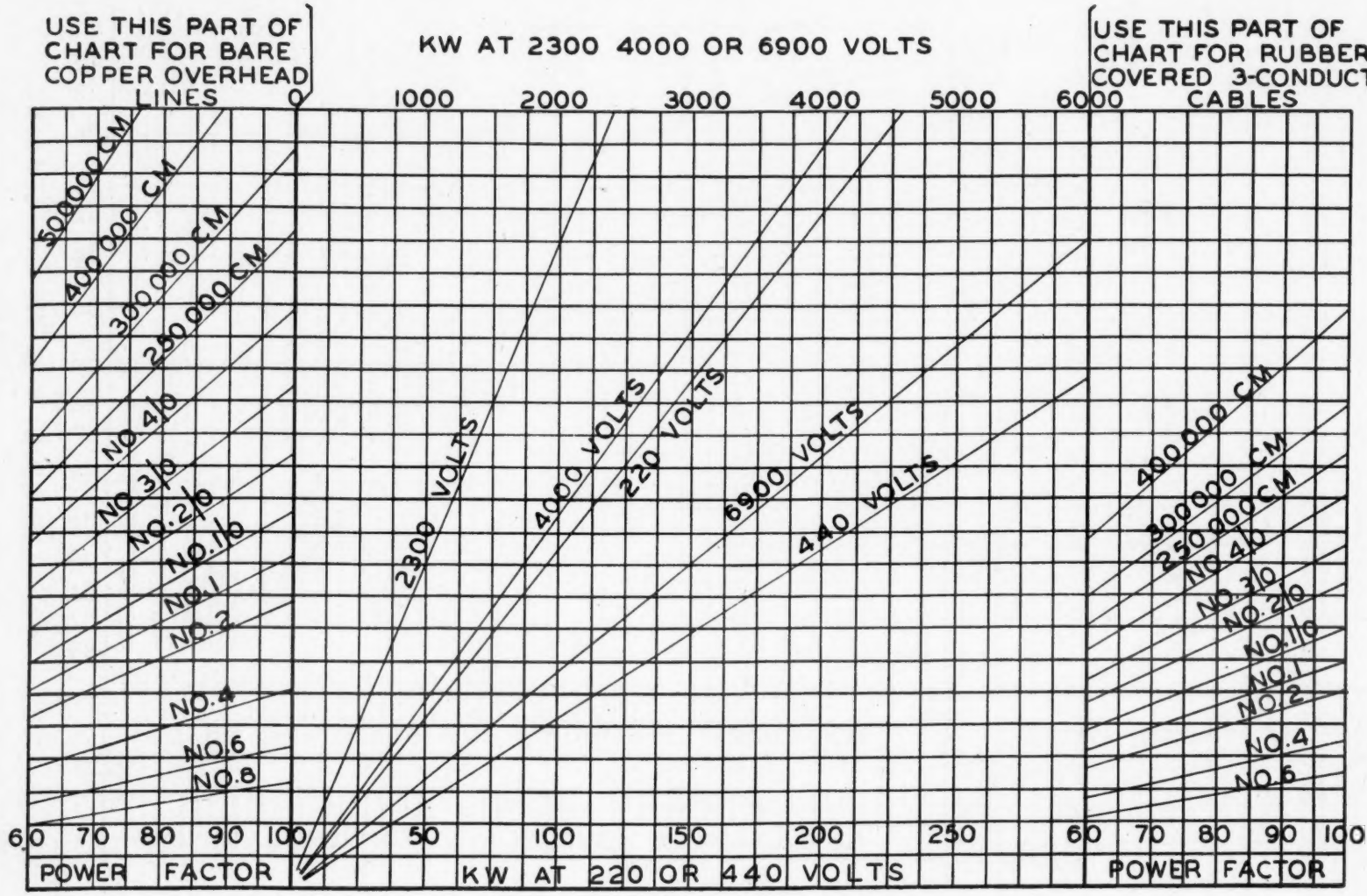

Fig. 4—Chart for selecting conductor size based on current carrying capacity

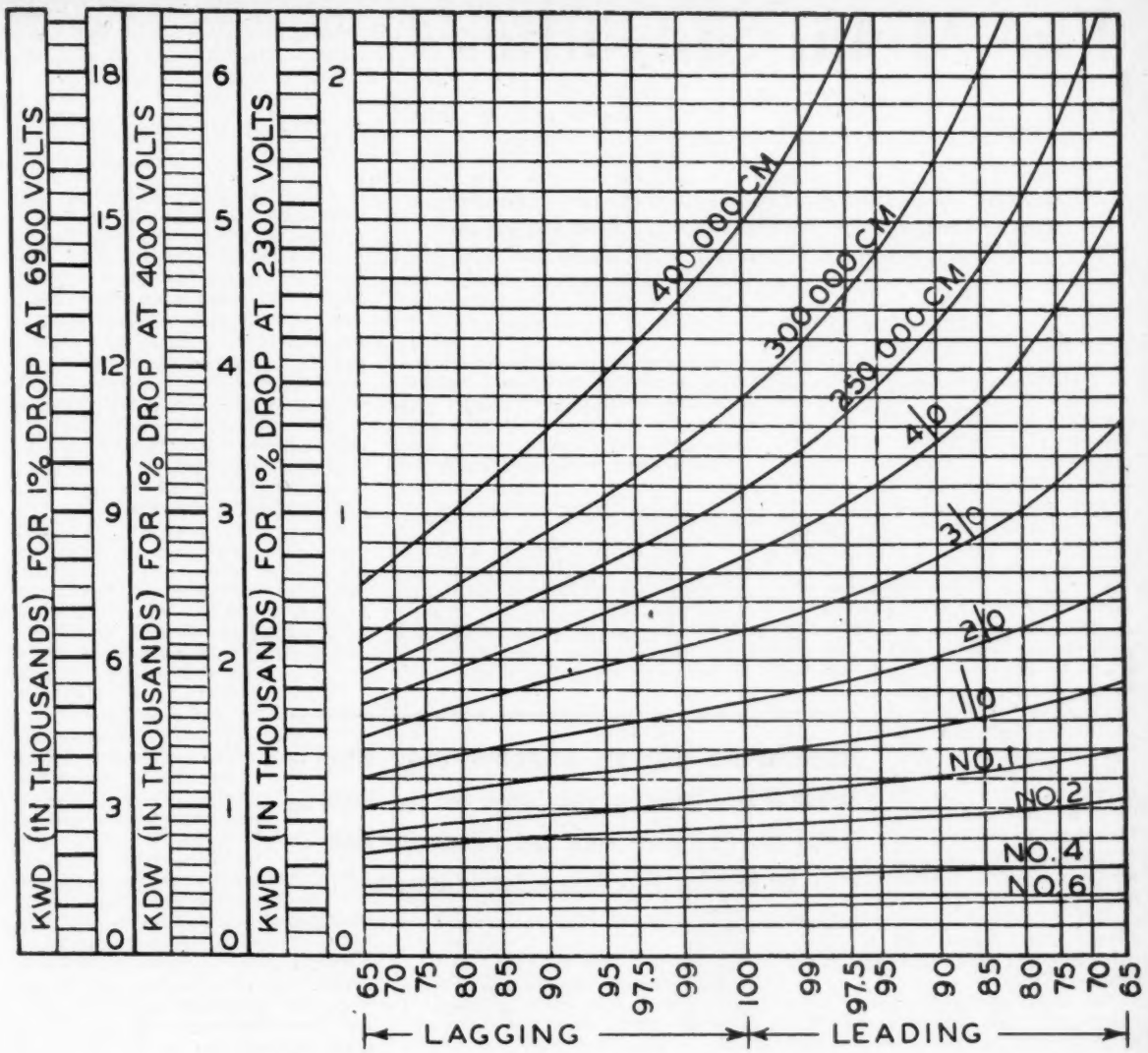

Fig. 3—Curve for determining voltage drop in 60 cycle 3 conductor cables 10/64-in. conductor insulation

At .95 PF 300 KW RKVA=100
Difference RKVA= 85

Therefore, .85 KVA of capacitors must be installed *at the load* to reduce the voltage drop from 10% to 7½%.

Example 6. Aerial Line

To determine the *conductor size* for a *voltage not shown* on the curve.

Assume a voltage of 440 volts, a load of 200 KW at .90 lagging power factor, distance 600 ft., voltage drop not to exceed 7½%.

Load KWD=200×.6=120

Since, with a given per cent voltage drop and power factor, the load which a line will carry is directly proportional to the square of the voltage, 30 KWD at 440 volts is equivalent to

$120 \times 2{,}300^2 \div 440^2 = 3{,}280$ KWD at 2,300 volts

Since, with a given load at a given power factor and voltage, the per cent line drop is proportional to the load, 3,280 KWD at 7½% drop is equivalent to

3,280÷7.5=437 KWD at 1% drop

Start at 437 KWD on the 2,300 volt scale, run horizontally to .90 power factor, then run vertically up to the first conductor curve and read

Conductor size=4/0.

Example 7. Aerial Line

To determine whether or not the 4/0 conductor in Example 6 has adequate *current carrying capacity.*

On Fig. 4, start at the bottom scale at 200 KW, run vertically upward to the 440 volt line, then run horizontally to the left to the .90 power factor line, then upward to the first conductor line. The conductor indicated is 1/0.

Since the conductor is required to maintain voltage (4/0) is larger than the conductor required to maintain low conductor temperature (1/0), it is obvious that the 4/0 wire will be satisfactory.

Approved by the Power Committee October 19, 1945.

The Metal Subsidies

Statement of Julian D. Conover, Secretary, American Mining Congress, Before the Senate Committee on Banking and Currency, April 24, 1946

IN the limited time available today I shall concentrate on the acute problem of the basic non-ferrous metals—lead, copper, and zinc—resulting from the OPA's unique and discriminatory controls over this industry. This problem calls for corrective action by the Congress. The amendment introduced by Senator McFarland and nine of his colleagues is the answer.

A year ago this committee was asked to continue price controls for another year, to June 30, 1946. Notwithstanding that the end of the war came—as President Truman reported to his annual message—much sooner than any of us anticipated—the officials charged with application of price controls have done little to remove them, and are now asking for further continuation of their powers for still another year. The reasons advanced today are virtually the same as those advanced last year except that the war argument no longer applies.

Supporting the McFarland Amendment Under Which a Portion of the Subsidy on Lead, Copper and Zinc Would be Shifted into the Ceiling Price, and Adjustments Made in the Premium Price Plan to Control Inequities

The immediate problem is to make sure that a year from now the Office of Price Administration is not back here again asking for a continuation of its powers beyond June 30, 1947. The unique treatment of the non-ferrous metals makes it particularly important that the Congress take action now to insure that the coming year is in fact a period of transition away from discretionary controls. Unless the Congress now requires a change such as the McFarland amendment provides, the OPA will certainly be here a year from now, citing the inadequate production to which its own policies are contributing to justify still further extension of its unique control over the non-ferrous metal industry.

The Metals Subsidies

For the basic non-ferrous metals, lead, copper and zinc, the OPA has since the beginning of 1942 rigidly frozen the ceiling prices at levels that have become more and more artificial, and has sought to maintain or increase production by awarding subsidies in its discretion on a mine-to-mine and month-to-month basis. The cost to the Government has increased materially and for the coming year, if the present artificially low prices are maintained, will reach or exceed $100,000,000. Needed adjustments to correct inequities in the plan, which I will later discuss, will add a further substantial sum. While production of these three metals rose until 1942, it has since declined and now, in spite of the increasing subsidies, is less than when subsidies were begun.

The operation of this subsidy plan is shown in Chart I.

In the case of lead the ceiling price was fixed at 6.50 cents a pound in January, 1942, and has remained frozen at that level ever since. The initial subsidy, or "A" premium, is 2.75 cents a pound. This premium is paid to each mine only on that part of its production which exceeds the quota set for that particular mine. The quota may be revised from month to month. In many cases it has been reduced to zero, so that the entire production of the mine receives the initial subsidy. About a year after the plan started, an additional subsidy or "B" premium was made available. At the present time, this may range from 0.1 cent to 5.50 cents a pound. Of course, the effective price received by each mine depends upon whether it is receiving any subsidies at all, whether it is receiving "A" premiums only or both "A" and "B" premiums, and upon the quota given it (because the production required to meet the quota does not receive the subsidy). The effective price may vary all the way from the fixed ceiling of 6.50 cents (which is all that some important producers receive) to as high as 14.75 cents. The price basis for each producer is determined separately by a "Quota Committee," and it may be changed from month to month, at the discretion of that committee.

A similar situation applies to the other metals. In the case of copper, the ceiling price since August, 1941, has been frozen at 12 cents a pound. An initial subsidy of 5 cents is paid for over-quota output and there are "special copper premiums" which range up to 10 cents additional. The effective price thus varies from 12 cents for some of the important producers up to 17 cents for those receiving only the initial premium, and up to 27 cents for those receiving the special copper premiums.

In the case of zinc the fixed price has been 8.25 cents since October, 1941. The initial premium is 2.75 cents, and two additional classes of

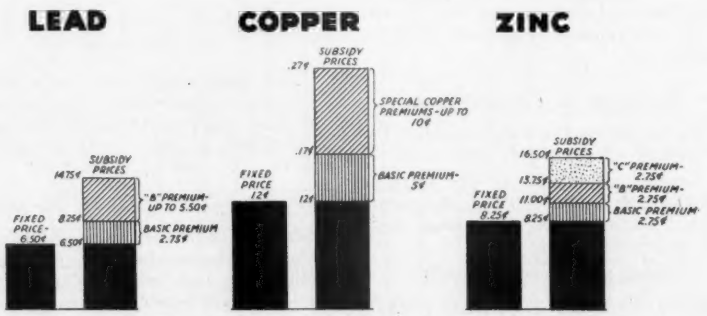

Chart I—Basic non-ferrous metals, fixed price and subsidies

premiums, "B" and "C," have been set up, each in the amount of 2.75 cents. The effective price for an individual producer may thus vary from 8.25 cents to 16.50 cents a pound.

Non-Ferrous Metal Industry Discriminated Against

This subsidy plan is unique. It is in a class by itself. Other subsidies are paid either on a national or regional basis without relation to the particular costs of individual producers. The metal subsidies are a striking exception to this general rule. They are fixed on a mine-to-mine basis and are changed from time to time to limit the profits of each mine. Though the purpose of the plan was to stimulate production, it soon developed into a means of profit control, with strong resemblance to a cost-plus system, and fraught with inequities and uncertainties for mine operators.

Even at its inception there were many in the mining industry and many War Production Board officials, charged with obtaining maximum production of metals, who strenuously opposed a subsidy plan of this type. These officials, possessed of a thorough knowledge of the mining industry, pointed out its defects and emphasized that maximum mine output could better be attained by fixing a price high enough to cover at least the normally economic operations from which the great bulk of production comes. They held to the view, since substantiated, that only a firm price at a reasonably higher level would permit the necessary forward production planning; if there were any undue profit earned by low-cost operations it would be recaptured through taxes. However, top officials of the OPA overruled the views of these WPB officials, and the subsidy plan was adopted.

The policy of maintaining metal prices at artificially low levels and of supplementing these with discretionary subsidies is basically unsound. The mining industry favors an immediate modification of the program so as not to retard further the day when we can return to a free competitive market.

During the transitional period toward a free competitive market the metal subsidy should be adapted to cushioning any shock to producers, processors and consumers. Thereafter, the subsidy program should be limited to meet the special situations of certain mineralized areas from which production may be required for national defense or in the interest of the national economy. The special situation of a mineralized area of this type will be ably presented to this committee in a separate statement by the Tri-State Zinc and Lead Ore Producers Association.

The immediate problem is to correct the discrimination against the non-ferrous metals industry imposed by the present subsidy plan. If this discrimination is ever to end and the unhealthy economic situation in this industry is to be cured, Congress must act *now* to require a reduction in the subsidies and a corresponding increase in metal prices. This must be by legislation because the OPA has shown every interest in maintaining its artificially low ceiling prices and its discretionary hold on these metals.

Legislation along the lines of the McFarland amendment is the only hope the industry has of returning to a free competitive economy and the only hope the taxpayers have of reducing the expense of supporting these subsidies.

The McFarland Amendment

The McFarland amendment requires that in continuing the subsidy program, adjustments shall be made to correct inequities in its present administration; that the subsidies as continued shall be on a non-cancellable basis; and *that the subsidies shall be reduced by shifting 60 per cent of the initial premium into the prices of the respective metals.* I will discuss first this last feature, which is contained in item (c) (4), beginning at line 14, page 2, of the McFarland amendment.

Chart 2 shows what this means in the case of lead. As stated before, the ceiling price of lead has been held down to 6.50 cents, and the initial premium is 2.75 cents a pound. The McFarland amendment shifts 60 per cent of this initial premium, or 1.65 cents, from the subsidy into the ceiling price. The initial premium is thus reduced to 1.10 cents and the ceiling price increased to 8.15 cents. The sum of the ceiling price and the initial premium remains at 9.25 cents, and the "B" premium, which ranges up to 5.50 cents, is unchanged.

Chart 3 shows a similar result with respect to copper. The ceiling price of copper has been frozen at 12 cents and the initial premium is 5 cents a pound. The McFarland amendment shifts 60 per cent, or 3 cents, of the basic subsidy into the ceiling price. The ceiling price thus becomes 15 cents and the initial premium 2 cents—a total of 17 cents as heretofore. The special copper premiums are not changed.

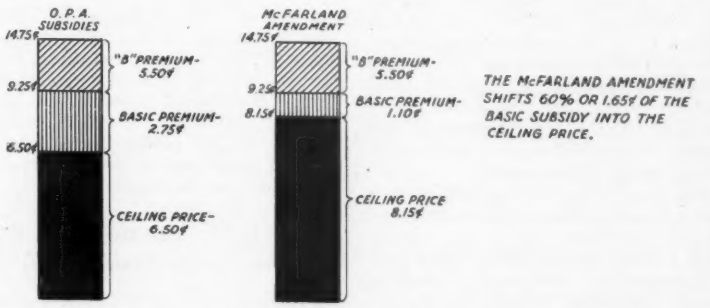

Chart 2—Lead

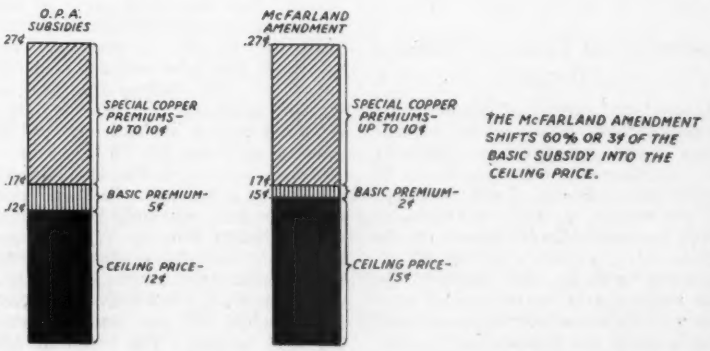

Chart 3—Copper

Chart 4 shows what happens in the case of zinc. Here the ceiling price has been held at 8.25 cents and the initial premium is 2.75 cents a pound. The McFarland amendment shifts 60 per cent, or 1.65 cents, of the basic subsidy into the ceiling price. The ceiling price thus becomes 9.90 cents and the initial premium 1.10 cents—a total of 11 cents as heretofore. The "B" and "C" premiums are not changed.

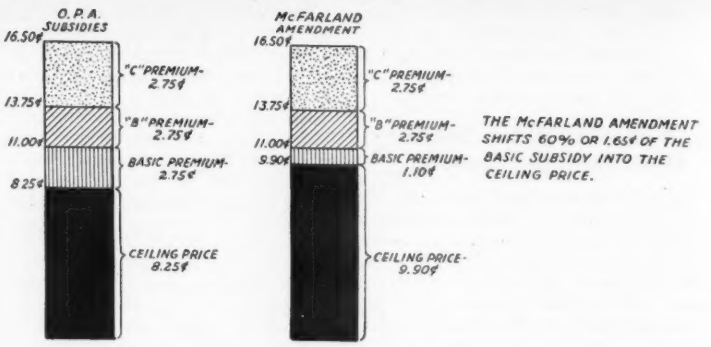

Chart 4—Zinc

Saving to the Taxpayer

The net effect is to reduce the cost to the taxpayer by shifting a portion of the cost of the subsidies to the purchasers of lead, copper and zinc. In dollars, the portion shifted, according to informal advice from OPA, is from a total of 115,000,000 to 55,000,000, or a net shift of 60,000,000. (Each of these figures is without provision for such additional amount as may be needed to correct inequities.)

This shift gives partial recognition to the changed situation since these wartime subsidies were instituted.

During the war, and while the Government was the principal purchaser of lead, copper and zinc, it mattered little to the Government whether it paid for these metals through the price or through subsidies. Today, however, the situation is far different. The Government has ceased to be the principal purchaser and most of the production now enters into manufactured articles for commercial sale. Yet the Government, through the subsidy program, is still paying a substantial part of the cost of producing these metals.

Not only this, but according to a recent announcement of the Office of Economic Stabilization, the subsidy plan is to be the principal mechanism to compensate for wage increases under the latest wage-price policy. This is a dangerous departure from a free economy, is definitely inflationary, and adds further to the cost levied against taxpayers for the benefit of those who purchase non-ferrous metals.

The time has come for the Congress to call a halt to this trend.

Government Loss on Foreign Metals

Under the policy of maintaining artificially low ceiling prices, further heavy losses are being incurred by our Government on its purchases of metals from abroad. Lead and copper are selling, in world markets, at prices substantially in excess of the OPA's ceiling prices, with indications that they will go still higher. To meet shortages in current metal supplies which have arisen under present price policies, the Government is purchasing foreign metals at these higher prices, is foregoing the import duty and is reselling them at the OPA ceiling prices. The Government is thus taking a direct loss on the sale of the metal—which in the case of lead already amounts to $25 per ton and in the case of copper to $10 per ton—besides the loss of the duty which it would normally collect. We see no justification for this further burden upon the taxpayer, and we point out the manifest unfairness against those domestic producers who are required to sell their product at prices below those which the Government itself is paying abroad.

Likewise, foreign purchasers of domestic manufactured products containing lead, copper and zinc enjoy the benefit of the artificially low prices maintained through the payment of subsidies. The foreign purchasers of such products are thus indirectly subsidized at the expense of the American taxpayer.

McFarland Amendment Will Encourage Production

Production is the key to reconversion and a healthy transition to our post-war economy. To obtain the required production of lead, copper and zinc, a portion of the subsidy must be transferred to the price, as provided under the McFarland amendment. It is an unhappy fact that, although the subsidy was instituted early in 1942 for the purpose of increasing production, the output of each of these metals in 1945 was actually below the output in 1941, before the program was inaugurated. In 1945 the domestic mine output of lead was 368,969 tons, a decrease of 72,457 tons or 15.7 per cent from the 1941 production. For copper the domestic mine output in 1945 was only 794,000 tons, being 172,072 tons or 17.6 per cent less than the 1941 output. In the case of zinc the domestic mine output was, in 1945, 611,998 tons, being 137,127 tons or 18.3 per cent less than the 1941 output. The trend of production has been downward since 1942.

It is true that a major factor in the falling off of production has been the shortage of manpower, *but it is equally true that the present price and subsidy system fails to provide the normal and necessary incentive for production in time of peace.* The McFarland amendment will encourage production by restoring a measure of the normal and necessary peacetime incentive.

Non-Subsidized Production

It must not be overlooked, in spite of the increasing proportion of metal production receiving subsidies, that there remains a large portion of the production which receives no subsidy and is dependent entirely upon the artificially low OPA ceiling prices. These low prices make no allowance for the steadily rising costs at these mines, which have been reducing the unit margin of earnings below any reasonable peacetime basis. The wartime incentive to push production to the highest possible level regardless of earning margins and heavy depletion of assets no longer exists. The normal and peacetime purpose of a mining company is to make profits and the officers of these companies are under a legal responsibility to their shareholders to try to make profits. They are liable to severe criticism if they deplete the stockholders' ore reserves for less than a fair price.

It must be remembered that a mine is a very different type of enterprise from a manufacturing establishment. Ore reserves are irreplaceable assets and the mining operation itself depletes those very assets. A manufacturer's function is a turnover function — he purchases materials, fabricates them and sells them. For various reasons, it may at times be good business to continue fabricating even when his prices are restricted to the point where his profits are nominal. He may not make any profits, but at least he is not eating up his capital. In contrast, every ton of ore

that a miner extracts from his mine reduces his capital.

For the large and important class of mines receiving no subsidies, it is obvious that the increase in the ceiling price provided by the McFarland amendment will serve as a much-needed incentive and stimulant to production.

Subsidized Mines—Inequities and Uncertainties Discourage Production

For the many mines now receiving subsidies, the inequities and uncertainties of the subsidy plan as administered tend to deter production. Uncertainty always discourages production. Producers dependent on subsidies are virtually on a hand-to-mouth basis, with their quotas subject to revisions from month to month. The methods of fixing quotas and subsidies are complicated, inadequately understood and in many respects arbitrary and unsound. A full description has only been made public in the last few months, in a report of the Senate Small Business Subcommittee on Mining and Minerals Industry (Senate Subcommittee Print No. 8, Feb. 1, 1946). The complexity of the "operating analysis" that may be required for a single mine is shown by one example, occupying 12 pages of fine type, which appears at pages 112 to 124 of this report.

In general, the amount of the subsidy for each producer is fixed separately by the quota committee, based on the producer's forecast of future costs, grade of ore and rate of production. Data submitted by the producer are analyzed by engineers on the committee's staff, but only in rare instances does the engineer actually see the property involved. The element of personal judgment inevitably enters into the selection and appraisal of the data used in computing the subsidy.

Leon Henderson foresaw the danger of thus fixing subsidies on a mine-to-mine basis upon individual cost estimates of possible production. In a memorandum to Donald Nelson, Dec. 11, 1941 (quoted at p. 43, Senate Subcommittee Print No. 8, referred to above), he warned that "Calculations of cost of such increments of potential production are difficult, disputable and very time-consuming." He hit the nail on the head, but despite his warning the subsidy program has fallen into the very errors and uncertainties which he cautioned against—with resultant discouragement to production.

The administration of the subsidies further discourages production by throwing all the risks on the mine

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79TH CONGRESS
2D SESSION

S. 2028

IN THE SENATE OF THE UNITED STATES

APRIL 19 (legislative day, MARCH 5), 1946

Referred to the Committee on Banking and Currency and ordered to be printed

AMENDMENTS

Intended to be proposed by Mr. MCFARLAND (for himself, Mr. MURRAY, Mr. HAYDEN, Mr. JOHNSON of Colorado, Mr. THOMAS of Utah, Mr. MURDOCK, Mr. TAYLOR, Mr. HATCH, Mr. CHAVEZ, and Mr. WHEELER) to the bill (S. 2028) to amend the Emergency Price Control Act of 1942, as amended, and the Stabilization Act of 1942, as amended, and for other purposes, viz:

On page 3, line 16, strike out "$100,000,000" and insert in lieu thereof "$50,000,000".

On page 3, line 25, strike out the period at the end of the line and insert the following: ": *Provided further*, That (a) payments of premiums, or purchases of copper, lead, and zinc or ores of copper, lead, and zinc, may be made after June 30, 1946, in such amounts as may be

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necessary to fulfill obligations incurred prior to July 1, 1946 with respect to 1946 and prior fiscal-year activities; and that (b) premiums shall be paid on ores mined or removed from mine dumps or tailing piles before July 1, 1947, though shipped and/or processed and marketed subsequently thereto; and that (c) the premium price plan for copper, lead, and zinc shall be extended until June 30, 1947, on the same terms as hertofore except that (1) adjustments shall be made to correct inequities against the producer and to encourage exploration and development work, (2) costs shall include adequate allowance for depreciation and depletion, (3) all classes of premiums shall be noncancelable unless necessary in order to make individual adjustments of income to specific mines, and (4) in order to adjust such plan to take into account the increasing proportion of civilian purchases and to reduce the cost to the Government, and to encourage increased production, the maximum price for each such metal, so long as a maximum price is imposed, shall be increased, effective upon the enactment of this Act, by an amount not less than 60 per centum of the initial premium of 5 cents per pound for copper, 2.75 cents per pound for lead, and 2.75 cents per pound for zinc originally established for such metals. Nothing herein shall prohibit the addition of new classes of premiums if deemed necessary to meet the cost of operations."

operator. If his forecasts of future costs, grade of ore, rate of production and other items prove to have been over-optimistic, so that the subsidy assigned is inadequate, he must ordinarily sustain the consequent monetary loss, without compensatory adjustment. If, on the other hand, he achieves lower costs than he forecast, mines a better grade of ore, or steps up the quantity of ore mined, or in short, in any other way returns more than the margin allowed by the committee's formula, the amount of his subsidy is promptly reduced. Under this procedure, the incentive towards increased efficiency of operations tends to disappear. It is a case of: heads the quota committee wins, tails the miner loses.

Time does not permit a full discussion of the defects and inequities in the Premium Price Plan as now administered. The formula for calculating earnings margins is unsound, gives no real incentive for efficiency or recognition for low costs, and fails to allow properly for depreciation and depletion, especially for the precious metal value in the ore.

The McFarland amendment, by transferring part of the subsidy to the price, will greatly reduce these harmful effects. It will provide assurance for the future which will permit advance planning and strongly encourage production.

Failure to Encourage Exploration and Development

Another effect of the subsidy plan on production should be brought out—its failure to encourage long-range prospecting and development work. Only through continued exploration for new ore reserves can the production of a mining property be maintained and its life extended. However, except in special cases during the war, subsidies have been calculated without allowing for any long-range exploration and development costs; and in some instances even current development costs have been arbitrarily limited. The meager margins allowed under the low ceiling prices and under the margin scale of the subsidy program leave no room for adequate development expense. Both for the low-cost, non-subsidized producers and for those receiving subsidies, an increase in ceiling prices and the confidence in the future which it will bring are needed if the search for additional reserves is to be renewed.

This matter is vital not only to the mining industry but to the future security of our country. A healthy mining industry is dependent upon continued exploration and development of ore reserves to replace those mined out. We are *not* a "have not" nation in respect to metals, but we can become one if long-range exploration and development, as well as active mining, are not carried forward vigorously.

Increased Production from Scrap

A further important source of metal production is from scrap metals and alloys. Dealers in scrap material have been subject to rigid price control. Their profit margin has been so narrowed by rising costs of operation as to reduce greatly the incentive for further scrap collection. Likewise, processors purchasing scrap have been caught in the squeeze between increased treatment costs and the artificially low ceiling prices under which they are obliged to sell the finished metal. Neither the dealers nor the processors have had any subsidy plan to relieve the situation. An increase in ceiling price under the McFarland amendment will relieve those hardships, and provide the incentive for increased production from scrap to help meet current needs.

Unfairness to Smelters and Refiners

The maintenance of artificially low prices under the subsidy program has been particularly unfair to smelters and refiners, who constitute an important link in the chain of metal production. Much of the output of nonferrous metals is handled by custom smelters and refiners who do not mine the ores which they treat. Since prices were frozen the smelters have had large increases in costs for labor and supplies and are now faced with further heavy increases which they are in no position to absorb. The premium price plan, however, provides for payments only to the mine operator and affords no relief to the smelter.

Further, many smelting contracts provide that the smelters' compensation be paid partly in dollars and partly in metals recovered. The metal that the smelter receives and sells as part of its compensation carries no subsidy, and the other features of the smelter contracts do not, as OPA has asserted, compensate adequately for increased costs. The smelter and refiner has been seriously and unfairly penalized and the regular flow of metal from mines to consumers has been hampered by the present unduly low price structure. Since smelting margins automatically increase with a rise in the metal price, the McFarland amendment will help to relieve this difficulty.

Custom mills, which treat large tonnages of purchased ore in various mining districts, have been squeezed in the same manner as the custom smelters, and need the relief afforded by the McFarland amendment.

Moderate Nature of Price Rise Under McFarland Amendment

Present artificially low prices for lead, copper and zinc have been in effect since the early days of the war. Ceiling prices were first set in 1940 and early 1941 by voluntary action of the producers, and following certain small increases for lead and zinc, prices have remained frozen at the present level ever since the subsidy plan was instituted.

From January, 1941, to February, 1946 (latest month for which figures are available), the wholesale price index of the Bureau of Labor Statistics rose from 80.8 to 10.7, an increase of 33.3 per cent. The average price rise for lead, copper and zinc (all of it attributable to the increases in lead and zinc in the first year of this period) has been only 7.9 per cent. (Lead 18.2 per cent, copper 0.4 per cent, zinc 13.8 per cent.) This 7.9 per cent rise is an arithmetical average for the three metals. Since the copper price has not gone up at all since January, 1941, but actually decreased by 0.4 per cent in that year, and since the tonnage of copper exceeds that of either lead or zinc, a weighted average figure would show a price rise of only about 5 per cent for these metals as a group. The rigid prices to which they have been held have become definitely out of line with the general commodity price index with its rise of over 33 per cent.

In shifting a portion of the subsidy into the price, the McFarland amendment would raise the price of lead only 25.4 per cent, that of copper 25 per cent, and that of zinc 20 per cent.

The McFarland Amendment and Inflation

The assertion is made by some within the OPA that the McFarland amendment, in permitting a moderate increase in price for lead, copper and zinc, would be inflationary. We do not agree. We submit that the overall effect of the McFarland amendment is less inflationary than a continuance of the metal subsidy program in its present form.

Inflation is a consequence of over-demand and under-supply. The metal subsidy program as administered uses borrowed funds to subsidize wage increases, to conceal higher costs of production and to keep prices of these metals artificially low. It thus creates increased purchasing power on the part of the metal users and contributes to the over-demand. On the other hand, as we have seen, it fails to encourage the production that would correct the under-supply. Without the corrections provided under

the McFarland amendment, the coming year will see these maladjustments accentuated.

The McFarland amendment will maintain and tend to increase the supply of lead, copper and zinc. Shifting part of the subsidy into the price will hold down the amount of new purchasing power created, and will bring *effective* supply and demand more nearly into balance. Still further, this shift provides a hope for the future. It prepares the way for a return to a free competitive economy; it thus gives confidence, and tends to deter speculative withholding and the conversion of dollars into hedges against price rises.

In some quarters these fundamental factors are disregarded and attention is focused on the assertion that an increase in ceiling prices of lead, copper and zinc will affect significantly the cost of the consumers' goods into which these metals are fabricated. Such assertions exaggerate the extent to which a 25½ per cent rise in the cost of lead, for example, would increase the cost of end products.

One of the major uses of lead is in the making of storage batteries, in which lead is the principal constituent. The increase in the price of lead under the McFarland amendment represents an increase in the cost of the ordinary storage battery of not more than 4 per cent. Even this is not the net increase because the purchaser of a new storage battery will be entitled to a higher refund for his old battery based upon the increased value of its lead content. The increased cost of all the lead used in an automobile, including the storage battery, is only 66 cents—or .0005 or one-twentieth of 1 per cent—of the cost of a low-priced automobile. This example is valid for other uses of lead, and of copper and zinc as well.

That stabilization officials likewise do not attach much importance to this aspect of the McFarland amendment would appear from the testimony of Deputy Director James F. Brownlee of the OES, before the House Committee on Banking and Currency on March 7 of this year (pp. 331-332 of Hearings on H. R. 5270). Speaking of the metal subsidies, Mr. Brownlee said, "They are not directly cost-of-living subsidies. . . . They are purely supply subsidies on commodities which are going to be badly needed in the construction program. From the viewpoint of stabilization, except as they refer to production, they, are, of course, not as important in the straight stabilization program as the other subsidies."

The implication is plain that a moderate rise in the prices of lead, copper and zinc would not cause an appreciable increase in the cost to consumers of the end products.

The real danger of inflation in connection with non-ferrous metals would be in a continuation of the present policy which fails to increase the supply, arbitrarily increases the demand, and provides no corrective for the future.

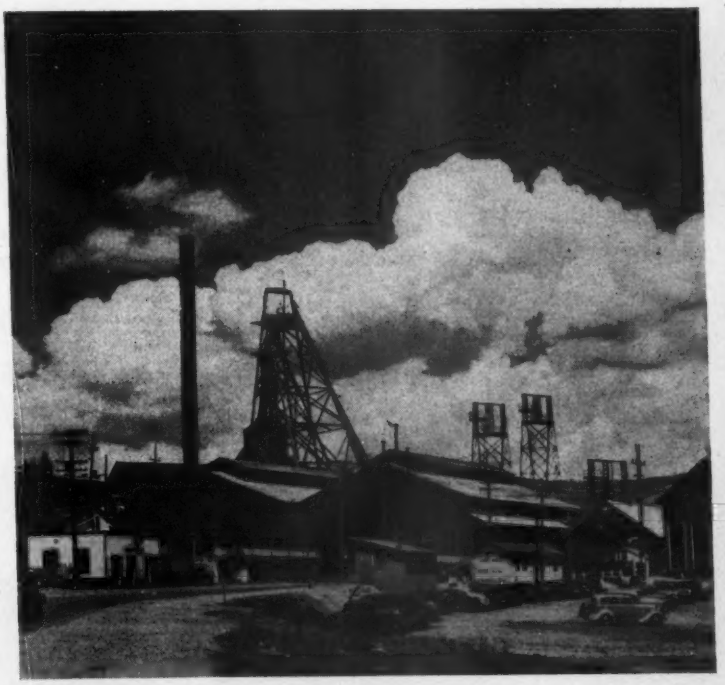
Necessity of Legislative Provisions

It may be asked why it is necessary to have legislation to shift a portion of the subsidy into the price for the non-ferrous metals and to correct inequities in the plan. The price control authorities have the discretionary power to do this and why should the matter not be left to administrative discretion?

In an earlier part of this statement we have, we believe, answered this question. Notwithstanding the fact that the stabilization authorities have had the power to shift part of the subsidy into the price, they have not done it. In fact, they are opposing such action. They have likewise failed to correct inequities in the administration of the plan. Only by including in the pending legislation, provisions requiring a definite step towards a free economy can there be any assurance that the industry will not be subjected to year-by-year requests for authority to continue OPA's unique and discriminatory controls over this entire industry.

Provisions calling for the lifting of controls as supply equals demand do not meet the peculiar situation of the non-ferrous metal industry. If the McFarland amendment is not adopted, the time when supply can equal demand may be indefinitely postponed.

Lead, copper and zinc have been subjected to a special type of subsidy treatment, and legislative provisions addressed to the special problems of lead, copper and zinc are urgently needed. Without legislation such as the McFarland amendment there is little prospect that the non-ferrous metals can recover a position of equality of treatment with commodities generally. *The McFarland amendment is the very opposite of class or discriminatory action. It does not make an exception for any particular commodities. It requires that the OPA stop making an exception against certain commodities.*



Production from non-ferrous mines will be encouraged by McFarland Amendment

It will be apparent to this committee that legislation designed to curtail administrative discrimination is not subject to the criticism that it is itself discriminatory.

Non-Cancellable Features of The McFarland Amendment

We wish to turn now to another feature of the McFarland amendment to which the mining industry attaches great importance. Item (c) (3) beginning at line 12, page 2, of the amendment provides that in extending the subsidy plan in modified form, all

(*Continued on page 77*)

OUR MINE A PROVING GROUND

The mine staff of the Climax Molybdenum Company has conducted a research program on wear resistant steels involving the milling of millions of tons of ore. A resident alloy steel metallurgist, with the assistance of our Detroit Research Laboratory, has made available at the mine the broad experience of the Climax technical organization regarding the composition, heat treatment and structure of the steels tested.

These tests have already established the value of molybdenum steels for many applications. Our research program continues for still further improvement.

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MOLY

Interest at high pitch at Conventions Sessions

"Coal's Future" Highlights Discussions at 1946 Convention

AMC's 23rd Annual Coal Convention at Cincinnati Hears Industry Operating and Economic Problems Aired

THE first post-war Coal Convention of the American Mining Congress, with over 1300 registrations, goes on the records as one of the most successful meetings of the coal industry. All sessions proved highly popular. The papers were thought-provoking and afforded the answers to many of the economic and operating problems which confront the industry in the transition from war to peacetime operations. Audiences were large and participated actively in discussion periods.

Capacity audiences at the two luncheons and the annual banquet listened attentively to addresses by important men of industry, science and Government. At the Monday luncheon, Edwin E. Woodman of the Durez Plastics and Chemicals Co., Chicago, cited wartime increases in plastics usage which will enhance the role of coal tar resins in this field.

The Tuesday luncheon session heard Professor A. L. Hughes of Washington University, St. Louis, a leading nuclear physicist, predict that atomic energy may be used for industrial power by 1966. The wartime assistant director of the Los Alamos project, where the first atomic bomb was tested, told convention delegates that within 20 to 30 years we may see uranium as a source of power in plants where ordinary fuel is expensive. He also predicted that large ships may be driven by atomic power.

Hughes emphasized that before any progress toward peacetime use of atomic power can be made, a decision must be made on its control as a war threat. He advocated the establishment of an international atomic energy authority empowered to license individual nations to use uranium energy. He said that as early as ten years from now, engineers charged with the problems of designing new power plants may seriously consider uranium as an alternative to oil or coal. "I don't think, however," he said, "that they will then take the plunge."

The Annual Banquet on Tuesday evening, April 30, was featured by a sparkling address on the problems faced by American Industry today by Warren Whitney of James B. Clow & Sons, Birmingham, Alabama. Mr. Whitney held the rapt attention of his audience as he called upon all thinking people to tell about the American system at every opportunity in order to dispel any thoughts both here and abroad that "it will not work." He described the strength of America as lying in the opportunity

George Smith, National Program Committee Chairman, opens initial convention session

system . . . "where they have a regard for the common man, but yet an uncommon man can rise above and own something and possess something and leave something to his children, and to the economy which made him." He said that the story of the American system should be told to persons in all walks of life, particularly the young people since they will assume the responsibility for America's future. He urged that emphasis be placed upon the enthusiasm that caused the conquest of our continent, the ambition that drives the individual to attain a cherished position, and the ingenuity and resourcefulness that makes for progress. He concluded by saying that the time to preach the gospel of the American system is now for "the future starts today."

He was introduced by Toastmaster George B. Harrington, president of the Chicago, Wilmington and Franklin Coal Company, past master in the art of presiding on such occasions. Mr. Harrington also introduced special guests, leading coal officials, and officials of the American Mining Congress. His rare humor and pleasing manner contributed much to the enjoyment of the 800-odd mining men and ladies present.

General Session

The Convention opened promptly, Monday morning, April 29. Julian D. Conover, Secretary of the American Mining Congress, summarized the purpose of the meeting in his opening remarks:

"With a firm belief in its destiny, the coal industry is meeting here today and tomorrow to consider its problems of the future. Coal does not have the problem of reconversion in the sense that it applies to a manufacturer of automobiles or refrigerators. On the other hand, it does have some very real and very critical problems of adjustment to a peace-time economy. The coal industry realizes more acutely than ever before, just how serious these problems are. They present a challenge which the industry must meet through its own efforts if it is to maintain its position as the premier source of heat and power. The coal industry accepts this challenge.

"With a potential overproduction of all forms of heat energy, post-war competition for fuel markets will be intense. Recognizing this, coal is no longer shutting its eyes to the serious threat presented by oil and gas in its normal markets. Their encroachments must be resisted on their own ground, by offering equal advantages in convenience and efficiency. * * *

"On another front coal producers are again faced with the prospect of higher wage costs. The industry is once more being squeezed between

Registration exceeds wartime meetings

the upward pressure of rising costs and the downward pressure of increased market competition. This, however, is nothing new. We have been faced with this situation for many years, and have met it through increasing mechanization of our mines and constant improvement in operating techniques.

"During the war, of course, progress in this direction was retarded; the primary objective was to produce the maximum possible tonnage with the men and machines available. But the brains of our engineers and research men among both the manufacturers and the operators, were thinking ahead, and the results of their thinking will shortly be available in the form of new machines and equipment for mining; new processes for coal preparation and improved techniques all along the line.

"Today we are meeting to take stock of where we stand and to see where we go from here. We know that the problems ahead are tough ones—but the coal operators and manufacturers have never been defeatists. Their history shows that the tougher the problem, the harder they tackle it, and these meetings will make it clear that this spirit is still guiding the coal industry."

Mr. Conover then introduced George L. Smith, National Program Committee Chairman under whose able direction the program for the convention had been formulated. Mr. Smith presided over the opening session, at which three excellent economic papers were presented.

"Economic Problems of the Coal Industry," was the subject presented by George A. Lamb, Assistant Director, U. S. Bureau of Mines, who advised the industry to maintain orderly and efficient marketing if it is to prevent destructive competition in the years ahead. He warned that oil and natural gas competition will be severe until there are more definite limitations on the reserves of these fuels. Mr. Lamb estimated that the bituminous coal industry will have a more favorable market than it had before the war, with possible requirements averaging 500,000,000 tons annually for the next 15 years.

From another speaker, delegates heard the optimistic report that coal burning gas-turbine locomotives, as well as new reciprocating steam types now in the development stage, will be able to match the cost of diesel-powered locomotives. This report came from Dr. J. I. Yellott, Director of Research of the Locomotive Development Committee, Bituminous Research, Inc.

Producers received a warning about future prospects for the domestic fuel market from B. F. Gebhart, vice president, Chicago, Wilmington and Franklin Coal Company, who admonished the industry that "Coal's future in the market for domestic heating depends upon its ability, through excellence of product, efficiency of distribution and convenience of use, to satisfy highly cultivated human desires."

Coal Beneficiation Session

The session on Monday afternoon was presided over by Joseph Pursglove, Jr., of the Pursglove Coal Mining Co., with interesting and instructive papers presented on: "Heavy Density Processes for Coal Beneficiation" by D. H. Davis, product control manager, Pittsburgh Coal Co.; "Drying Coal Thermally and Mechanically" by Laning Dress, preparation engineer, Pyramid Coal Corp.; and "Cleaning Anthracite Small Sizes" by W. H. Lesser, Pierce Management, Inc.

D. H. Davis stated that important developments have occurred in the past ten years in preparing coal for market. Among these new developments, he said, was the introduction of gravity processes by which coal can be separated from impurities on a strictly gravity basis independent of the size of the particles separated. He averred that standard methods of washing coal will continue in general use, but predicted that new methods using a heavy density liquid to wash coal coming from the mine will give the maximum yield of clean coal with a minimum loss of coal in refuse.

Laning Dress described methods of drying coal for marketing, and outlined to coal operating men the principal methods and types of equipment used to remove the moisture from washed coal. Explaining the problems faced in dewatering coal, he said: "The amount of moisture retained on the coal varies a great deal, largely depending on the size particles. In coarse sizes, water can be shaken off rather quickly due to the amount of voids and the smaller surface area. In fine sizes, the surface area is increased, and the coal tends to mass together, thus making it more difficult for free moisture to escape. Generally speaking, drying and dewatering coal does not present much of a problem with sizes above ½-inch and the choice of dewatering and drying methods, whether by screening, by mechanical or heat processes, depends upon many factors, such as size of coal reduction of moisture desired, and climatic location of markets."

New uses found for small sizes of anthracite and new methods of cleaning them developed during the war to present the consumer with a "tailor-made" product, are "contributing meritoriously to the current demand for coal," W. H. Lesser said. He stated that each year the use of small anthracite coal sizes has become more diversified. He pointed out that most of these sizes are used to generate steam in large steam-electric generating plants and that this use made the development of stokers and other combustion accessories necessary.

He listed the other developments in the diversified uses of small anthracite sizes as: (1) briquetting, attaining a production of 1,400,000 tons of anthracite briquettes in 1944;

Coal's Future Featured—Seated (left to right): G. A. Lamb, Ass't. Director, U. S. Bureau of Mines; B. R. Gebhart, Vice Pres., Chicago, Wilmington & Franklin Coal Co.; J. I. Yellott, Director of Research, Locomotive Development Committee, Bituminous Coal Research, Inc.; Standing (left to right): G. L. Smith, Vice Pres., Rochester & Pittsburgh Coal Co., and J. D. Conover, Secretary, American Mining Congress

(2) shortages of metallurgical coals used by by-product coking plants opened up a market for 200,000 tons of small anthracite coals for blending with coking coals, a market which has future prospects of promise; (3) development of 3-inch cubes containing 75 percent buckwheat and 25 percent bituminous coal bound together with oil, which are wrapped six cubes to a package thus enabling householders to handle the coal without soiling their hands; and (4) development of pellets of anthracite about ¼ to ¾-inches long and⅛-inch in diameter, for burning in grates.

Tuesday's sessions were given over to discussions of problems of strip mining, mechanized mine operations, reclamation of coal lands, safety, mine haulage, and modernization of the mine organization. Two sessions were held in the morning, one covering questions of strip mining and the other one problems of underground mines.

Mechanical Mining

Mechanized mining in thin seams of coal can be successful if mine management selects the proper type of mechanical equipment, employs and trains a good type of worker, and provides a high type of supervision, J. J. Snure, assistant production manager of the Rochester and Pittsburgh Coal Co., told delegates at the deep mine session which was presided over by Frank G. Smith, assistant to the president, Sunday Creek Coal Co. Stressing the importance of proper mechanical equipment and responsibilities of mine management when mining thin seams of coal, Mr. Snure stated:

"The wartime days of mining coal are over! The industry has lost efficiency in the past few years, and now not only has the job of regaining this loss but also the assignment of getting ready to do a better job than we have ever done before. The rapid depletion of the thicker and more economically operated seams has forced a greater production from thin seams which a few years ago most companies would have considered impractical. Thin seams coupled with increased wage rates, labor contracts unfavorable to mechanization, decreased productivity of labor, quality requirements of the consumer and added competition from other fuels, mean that we must have more efficient face equipment and at the same time it must be managed more efficiently than we ever did with hand loading or conveyors."

Problems of maintenance of mining equipment were discussed by William Burnett, electrical engineer of the Peabody Coal Co. He stressed the importance of improving the ability of maintenance men, and ways and means for training them in order to assure the most effective operation of equipment in coal mines, saying: "Only through organization and loyalty, and determination not to be licked on this maintenance problem, have the various mine crews finally molded themselves into a working team. Most of the credit for this goes to the top sergeant—the chief electrician, and little if any to the generals. The organization below has been assisted some by the necessity on top to maintain and keep in repair new, complicated, and expensive preparation plants. Sympathy brought about by similar problems has made for a working unit, both top and bottom."

George R. Higinbotham, production manager of the Consolidated Coal Co., described the mining systems in use in the Fairmont field of the Pittsburgh coal seam. "When loading machines were first placed in the mines," he pointed out, "it was of course expected that they would have to perform under the conditions which were developed for hand loading. This is natural, since most of the mines in this country have been in operation for several years, and a good part of the development was already made. However, after the equipment was installed, it did not take long to find out that the practices followed in hand loading would have to be modified for mechanical mining. This forced the operators to begin to think of new systems of mining.

"What system to use? The answer is not so simple. There are several factors that should be taken into consideration, such as:—type of equipment, thickness of seam, contours of the bed, value of coal, value of surface, the structure and amount of overburden, and gassy or non-gassy conditions.

"To sum it all up, it takes a great deal of study by a competent mining man to lay out a system for any given locality or type of equipment."

Reclaiming Stripped Lands

In a symposium covering programs for reclaiming and conserving stripped-over coal lands, mining men from the States of Indiana, Illinois and Pennsylvania pointed out that reforestation of such lands has proven the most successful method of reclamation and that great benefits have been derived from such programs.

Experiences of Indiana coal stripping operators in revegetating mined out lands were outlined by L. E. Sawyer, director of forestry and reclamation of the Indiana Coal Producers Association. He recounted that far-sighted coal strip operators in Indiana started to revegetate mined out areas by planting forest trees in the spring of 1926, and that by 1930 nine large strip mining companies had programs for planting on their mined-out lands. Results of these programs have been excellent, he reported.

Experiments made by Illinois coal strip mine operators in their search for productive uses for mined-out lands are now showing results which indicate conclusively that under a scientific approach, a major part of the depleted properties can be converted from unsightly tax liabilities into income-producing assets, James W. Bristow, secretary-treasurer of the Illinois Coal Strippers Association, reported.

Mr. Bristow said that since 1930 Illinois strip mine operators have planted over ten and one-half million forest trees on mined-over properties, expending $130,000 to accomplish this. The survival ratio of these plantings has turned out to be 66.2 per cent, he added.

Bituminous strip mining in Pennsylvania grew from a production of two and three-quarter million tons in 1939 to over twenty-two and a quarter million tons in 1944, primarily due to the huge demands created during the war years, R. T. Laing, executive secretary of the Mineral Producers Association of Pennsylvania, told delegates.

"Since 1935," he said, "the Department of Forests and Waters in Pennsylvania have distributed for planting 100,000,000 trees. In addition to this, private nurseries throughout the State have sold many millions. Most of these trees have been purchased by anthracite and bituminous coal companies and a considerable portion have been used on strip lands. Approximately 500,000 trees will be planted in the spring of 1946."

This session was presided over by Hugh B. Lee, vice president of Maumee Collieries Co., Terre Haute, Ind.

Management, Safety and Transportation

Afternoon sessions embraced discussions of modernization of mine organization, safety, mine haulage methods, and coal stripping operations. H. C. Nyquist of the Tennessee Coal, Iron and Railroad Company, chairmanned the deep mine session.

R. E. Salvati, vice president of the Island Creek Coal Company, stressed the importance of selecting prospective supervisors of mining operations with care, and told of the value of a definite training program to fit them for their exacting duties, particularly in mechanized mining.

He cited the army system of selecting candidates for Officer's Training Schools as a splendid example of careful selection of prospective leaders. "The same general rules," he said. "may well be applied to selecting prospective supervisors. The more careful the selection the smaller the failures on the job, and the cost to the company will be much less during the

On the Lighter Side—

Good music and Bob Kennedy, singing star of "Oklahoma," highlight convention entertainment

Bridge luncheon for the ladies

Capacity crowd enjoys Annual Banquet

Atmosphere of good fellowship prevails at luncheon sessions

probationary period. Supervisors chosen unwisely may be very expensive to the company. No one can be selected who will at once perform at high rate of efficiency, for, regardless of how well his fundamental character and ability fit him for leadership, only through experience and training can he fully master his work. However, it is undeniable that the more care in selection the less difficult the training."

In a paper prepared by F. J. Peternell, safety engineer of the Union Pacific Coal Co., and read by John B. Hughes of the same company, the safety program of that company was thoroughly outlined. It was pointed out that the company has had an established safety program in effect at its mines at Rock Springs, Reliance, Stansbury, Winton, Superior, and Hanna, Wyo., for about 20 years and that notable progress has been made in reducing accidents, and a worth while contribution has been made to the safety, health and general welfare of the company's employes.

Engineering and operating developments in mine car transportation during the past 10 years have progressed along with the development of improved loading of coal at the mine face, C. R. Nailler, general manager, and C. C. Hagenbuch, assistant to the vice president of the Hanna Coal Company reported.

They emphasized that track-mounted haulage equipment is still the most widely used method of underground coal transportation. Improvements in mine car transportation have been engendered by the desire for (1) low cost per ton-mile between terminal points, (2) maximum and continuous production from working units and (3) greatest coal recovery from a single tipple site at an economic haulage cost.

Ray Cobb, superintendent of the West Kentucky Coal Company, prepared a paper which described the use of belt conveyors for hauling coal from coal face to tipple. He said that the first belt conveyors for underground mining in the United States were installed in 1929 and the first 100 per cent belt conveyor mine was started in 1934 in eastern Kentucky. He reported that at present there are over 130 miles of belt conveyors in operation in coal mines in the United States. In his absence, his paper was read by J. A. Bottomley, Sahara Coal Company.

Strip Mining

Coal stripping operators attending the afternoon strip-mine session heard James G. Berry, field engineer of the U. S. Rubber Company, describe the future uses of rubber in open pit mining. He told them that the major future use of rubber in open pit mining will be "in large size, low pressure tires" and said that the rubber industry had made great strides in developing stronger tires than those which were in use before the war. He also described an interesting development in the use of wire cord in making truck tires.

R. M. Dickey, sales engineer of the Bucyrus-Erie Company, described the use of large dragline excavators in the removal of coal at stripping operations. He said: "The coal stripping industry is vitally interested in the ultimate sizes which may be attained by dry-land excavators. The largest size to which the independent-motor walking dragline can be designed and built cannot be established at this time, because it will probably be determined not so much by the skill of the designers and builders as by external factors. * * *

"The major impetus to the use of progressively larger stripping machines has come in recent years from increasing labor costs and increasing stripping ratios. At some time the opposing influences will balance each other, and at this time the limits to excavator sizes will be established."

R. P. Mauger, president of the Mauger Construction Company, and Clayton G. Ball, Paul Weir Company, in a joint paper presented by Mr. Ball, outlined the problems met in strip mining two seams in one operation. They pointed out that the stripping of two dissimilar seams separated by a hard, massive formation in one operation is a complex process. "It involves the careful coordination and integration of a number of operating steps which compose the total sequence of operation," they said. Continuing, they emphasized: "It requires the use of a number of diverse and special-purpose units of equipment. We believe that the utmost attention to adequate supply and efficient distribution of power, to maintenance of roads and equipment and to close adherence to carefully engineered layout and sequence of operation is vital to the satisfactory stripping of our properties."

This session was presided over by T. G. Gerow, of the Truax-Traer Coal Company, Chicago, Ill.

Manufacturers' Division

The Manufacturers' Division of the American Mining Congress held its annual meeting on Monday afternoon. H. V. Brown, chairman of the Division, presided. He lauded the activities of the manufacturers' committee who prepared and presented a brief to OPA calling for decontrol of mining machinery and supplies. He then introduced I. B. Lewis of OPA who outlined the activities of that

Strip mining discussion draws crowd

agency with respect to the proposed decontrols over mining machinery and equipment. He forecast early issuance of a decontrol order but stated that the order may not go as far as the industry wishes due to the fact that many items used in mining are of more general industry application and must be considered from a broader economic standpoint.

Following his talk, the Division selected Cleveland, Ohio, as the next Convention and Exposition site; this choice being made since it was not felt that sufficient exhibit space or accommodations were available in Cincinnati to take care of the huge coal show anticipated in 1947. Dates for next year's meeting were set for May 12-15.

Officers elected for the remainder of 1946 include: *Chairman*—R. H. Pearson, Gardner-Denver Company; *First Vice Chairman* — Thomas McNally, McNally-Pittsburg Company; *Second Vice Chairman*—J. J. Huether, General Electric Company; and *Third Vice Chairman*, J. H. Fulford, Jeffrey Manufacturing Company. For the 1947 term, the Division Officers will be: *Chairman* — Thomas McNally; *First Vice Chairman*—J. J. Huether; *Second Vice Chairman*—J. H. Fulford; and *Third Vice Chairman*—M. L. McCormack, Ingersoll-Rand Company.

Manufacturers' division airs decontrol problems

BETHLEHEM'S No. 5 STEEL TIE

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No spiking . . . no gaging . . . little or no maintenance. Stout, solid track that doesn't spread. Faster placing of cars . . . fewer derailments. These are the ways you save with No. 5's in your room track.

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BETHLEHEM STEEL

WHEELS OF GOVERNMENT

As viewed by A. W. DICKINSON of the American Mining Congress

GOADED on by frantic appeals from distressed constituents, who complain bitterly of the vanishing coal supply, Senators and Representatives are thundering protests at the rule-or-ruin attitude of the mine workers' leader and at the apparent lack of vigorous corrective action on the part of the Administration.

Otherwise the Congress is laboring with the British loan bill, extension of the OPA and the Stabilization Acts, continuation of the military draft, the minimum wage measure, the departmental supply bills and lesser legislation. Forecasts on adjournment now range from July 10 to August 1.

Coal Production Crisis

Up to the present writing the bituminous coal miners have continued to remain away from the mines in the struggle over the formulation of a new wage contract. The mine workers' leader has continued to insist that there will be no discussion of wages and working conditions until the matter of a "welfare and safety fund" has been settled. This position was approved by the UMWA Policy Committee of 250 mineworker representatives reassembled at President John L. Lewis' call on May 7.

Demands similar to those made of the bituminous coal operators have also been presented to the anthracite industry and a strike call has been issued in the anthracite region for May 31.

Meanwhile the White House, through the Secretary of Labor and his well known conciliator Edward McGrady, is endeavoring to bring about resumption of production. The President has asserted that the situation amounts to a "national disaster," with nearly a million workers idle in industry and the services of railroads and public utilities seriously curtailed.

While some Senators and Representatives in Congress are calling for Government seizure of the mines others are turning to legislative action. Representative Francis Case of South Dakota has suggested that, "All that is needed to do something about it is to place an amendment on the Case bill now reported to the Senate, saying that whenever a proper agent of the Government, the President, or the Mediation Board proposed in the bill, finds that a strike constitutes a national disaster, continuation of the strike and failure to submit the issues to arbitration shall constitute a forfeiture of the exclusive bargaining rights conferred by the Wagner Act."

A House Judiciary Subcommittee has conducted hearings and is taking action on a bill introduced by Representative A. Willis Robertson of Virginia. This measure would make it unlawful for any employer to make payments to a representative of any of his employes or for such a representative to receive payment, except payments to an employe for services and deductions for union dues. This would outlaw "participating royalties" and the union-administered "welfare and safety fund" proposed by the mine workers.

OPA-McFarland Amendment

The Senate Committee on Banking and Currency, following extended hearings on the OPA bill, is now engaged in writing up its version of that storm-tossed measure.

The House passed the Spence bill April 18 and provided for the termination of the Price Control and Stabilization Acts March 31, 1947. Included in the House version were provisions to fix price ceilings to yield all cost outlays plus a reasonable profit on every item under price control; to remove all price controls from a commodity when its production during the preceding 12 months equals the volume produced in the fiscal year 1941—certifications to be made by the Secretary of Agriculture for farm products, and by OPA industry advisory committees for most other items; to end all food subsidies on December 31. 1946 with present subsidy payments being reduced in 25 percent doses every 45 days beginning July 1, 1946; to remove all subsidies on meat and livestock on June 30, 1946; to deny OPA authority to make wholesalers absorb higher prices on reconversion items; to require the President to report on January 1, 1947 instead of April 1, 1947 what commodities are still so scarce that price controls should be continued; to require the OPA to report to Congress by October 1 what plans it has formulated for liquidating the price control program, and to limit amounts to be expended for subsidy payments—those on copper, lead and zinc, however, remaining at $100 million.

During the Senate Committee's OPA hearings mining industry witnesses were given the entire morning of April 24 to present their case for adoption of the amendment introduced by Senator Ernest W. McFarland of Arizona, which would shift a portion of the subsidy on lead, copper and zinc into the ceiling price.

Washington Highlights

CONGRESS—Calling for action on strike crisis.

COAL—Robertson bill would outlaw "participating royalties."

OPA—McFarland Amendment shifts part of subsidy into price.

NON-FERROUS WAGES — Federal panel reports recommendations.

MINIMUM WAGE — House renews action.

GWYNNE BILL—Chance for enactment improves.

CASE BILL—Coal strike may spur Senate.

FREIGHT INCREASE—ICC would up rates 25%.

SILVER — Subcommittee agrees on 90.5 cent price..

POLLUTION—Bad bill reported to House.

The amendment would also make all classes of premiums non-cancellable and cause the administrators of the Premium Price Plan to allow adequately for depreciation and depletion, encourage exploration and development, give suitable recognition of precious metal values and provide incentives for efficiency in operation.

Appearing for the industry were Secretary J. D. Conover, American Mining Congress; O. W. Bilharz, President, Tri-State Zinc and Lead Ore Producers Association; Ernest V. Gent, Secretary, American Zinc Institute; R. R. Eckert, Secretary, United States Copper Association; and Felix E. Wormser, Secretary, Lead Industries Association.

Mr. Conover explained to the Committee that the metal subsidies, unlike others which are paid either on a national or regional basis without relation to the particular costs to individual producers, are fixed on a mine-to-mine basis and are changed from time to time to limit the profits of each mine. He remarked that though the purpose of the plan was to stimulate production, it soon developed into a means of profit control, with strong resemblance to a cost-plus system, and fraught with inequities and uncertainties for mine operators. He counseled that during the transitional period toward a free competitive market the metal subsidies should be adapted to cushioning any shock to producers, processors and consumers, but that thereafter the subsidy program should be limited to meet the special situations of certain mineralized areas from which production may be required for national defense or in the interest of the national economy.

Conover explained that the McFarland amendment reduces the subsidy by shifting 60 percent of the initial premium into the prices of the respective metals. He showed that this would raise the ceiling price for lead from 6.50 cents to 8.15 cents; for copper from 12 cents to 15 cents; and for zinc from 8.25 cents to 9.90 cents. This shifting of a portion of the cost of the subsidy to the purchasers of lead, copper and zinc, he said, would effect savings to the taxpayers amounting to $60 million. Full text of his statement—in which the Committee showed strong interest and as to which they asked numerous questions—appears elsewhere in this issue.

Non-Ferrous Board

On April 30 the non-ferrous fact finding board made its report recommending a general wage increase of 18½ cents an hour in the non-ferrous metal industry, with 5 cents of the proposed increase to be retroactive to December 1, 1945, or to the date when the union demanded an increase in wages, whichever is later. It was recommended that the balance of the increase become effective upon resumption of the 40-hour workweek or July 1, 1946, whichever comes first. The report covers operations in the Western States as well as smelting and refining plants in other parts of the country. Strikes had begun on January 21 following demands of increases from 30 percent to 30 cents an hour.

The Board was made up of George E. Strong, Washington, D. C. attorney; Justice James H. Wolfe of the Utah Supreme Court; and Dr. Carl W. Borgman of the University of Colorado.

Minimum Wage

Following Senate passage of the Pepper 65-cent minimum wage bill, discussed last month, the House Committee on Labor has now renewed consideration of this legislation. It is believed that if any minimum wage bill ever gets to the House floor it will be amended, as was the Senate measure, to permit farm labor costs to be included in the computation of parity prices. The White House has announced that this will result in a veto.

Meanwhile court decisions adverse to employers continue to roll out. The Supreme Court has denied review in the case of Alaska Pacific Consolidated Mining Company. The lower courts had declared unlawful the practice of splitting the work shift into 6 hours of straight time and 2 hours overtime, so that in a week of 7 days, employes worked 42 hours at straight time and 14 hours overtime for the same total wages that they received for 56 hours before the Wage-Hour Act became effective.

In the Schulte vs. Gangi case the Supreme Court held that the Wage-Hour Act bars compromise settlements between employers and their workers on claims for overtime compensation and liquidated damages.

In Virginia a Federal District Court ruled that local sawmills supplying mine timber come within the provisions of the Wage-Hour Act.

Gwynne Bill

The bill, H. R. 2788, introduced by Representative Gwynne of Iowa, which would limit suits for back pay and "liquidated damages" to one year, is due for House floor action in the near future. Majority Leader McCormack has assured Representative Clarence J. Brown of Ohio that he will program the Gwynne bill at an early date. Included in its provisions is language which would permit the courts to reduce damages in whole or in part upon an affirmative showing by the employer that the violation was not wilful and that he acted in good faith. A further extremely important feature sets forth, "That no liability shall be predicated in any case on any act done or omitted in good faith in accord with any regulation, order or administrative interpretation or practice, notwithstanding that such regulation, order interpretation, or practice may, after such act or omission, be amended, rescinded or be determined by judicial authority to be invalid or of no legal effect."

In view of court decisions and administrative rulings in recent years many employers face bankruptcy if the Gwynne bill is not enacted.

Case Bill

The present national crisis due to the coal strike may afford an opportunity for action on the greatly desired Case bill in the form in which the Senate received it from the House. The inadequate labor disputes bill now on the Senate calendar under the number H. R. 4908 (the original designation of the Case bill) may be called up for action under the present clamor to "do something about strikes." This would give an opportunity to substitute the real Case bill. Another possibility is that the Robertson bill (see above) outlawing "participating royalties" may come over from the House and afford a carrying medium for the real Case bill as a "rider."

Freight Rate Increase

The ICC opened hearings May 6 on the petition of the railroads for a 25 percent increase in freight rates. Exceptions to the 25 percent increase are made in the case of natural resource products, where the increases proposed are as follows: 6 cents per 100 pounds on petroleum and its products in tank cars; 25 percent on crude petroleum when not taking petroleum rates; 80 cents per ton on iron and steel; 12 cents per ton on iron ore; 15 to 40 cents per ton on all coal and coke; 20 cents per ton on sand, gravel. crushed stone and slag; 20 cents per ton on sulphur; 40 cents per ton on silica; 30 cents per ton on fluxing stone; 30 cents per ton on raw dolomite; 20 cents per ton on bituminous asphalt rock, asphaltic limestone, and on asphalt coated rock. Other products of mines would carry the 25 percent increase.

The OPA has filed a brief in opposition to the proposed 25 percent increase stating that it would be inimical to the interests of the national economy "when inflationary pressures are so acute." Briefs have also been filed in opposition to the increase by the Department of Agriculture and numerous State agencies.

In the course of the present hearings the ICC will also determine whether or not general freight rate increases, held in suspension since

May 1943, should be amended and permitted to go into effect promptly in view of the current proposals.

Treasury Silver Sales

An agreement has been reached by the Senate Appropriations Subcommittee on the silver "rider" discussed last month. The compromise would authorize the Treasury to pay 90.5 cents per ounce to producers of newly mined domestic silver (monetary value of $1.29 less 30 per cent seigniorage), and to sell silver to manufacturer consumers at the same price. The amendment further provides that after two years both the purchase and sale price would rise to the full monetary value of $1.29 an ounce. It is understood that the Subcommittee is now awaiting an expression from House members interested in the rider before reporting the Treasury-Post Office supply bill to the Senate.

The Subcommittee conducted hearings on the rider on April 9, 10, 11, 16, and 19. Among those offering testimony were Edward H. Snyder, President, Combined Metals Reduction Company; Senators Charles C. Gossett (Dem., Idaho) and Eugene D. Milliken (Rep., Colo.); Reps, Compton I. White (Dem., Idaho), Berkeley Bunker (Dem., Nev.), Michael J. Mansfield (Dem.. Mont.) and John R. Murdock (Dem., Ariz.); Tom Lyon, Manager, International Smelting and Refining Company, Utah; James B. Hogle, Assistant Manager, Rico-Argentine Mining Company. Colorado; Carl A. Trauerman, Mining Association of Montana; Henry Rives, Secretary, Nevada Mine Operators Association; and Representative Henry Dworshak (Dem., Idaho). The point was made by Mr. Snyder that no one would think of authorizing the sale of a portion of the Nation's gold to manufacturers at a price of $19.25 per ounce, equivalent to 55 percent of its monetary price. He and all of the witnesses urged that consumers of silver be required to pay the monetary value of $1.29 for Treasury silver and it was repeatedly explained that the silver content of ores constitutes an important encouragement for lead, zinc and copper producers.

Water Pollution Bill

The House Committee on Rivers and Harbors on April 13 reported an undesirable water pollution bill, H. R. 6024, containing certain harmful, features adapted from the Mundt bill. No request has been made of the Rules Committee to provide for floor consideration of this measure and in view of the legislative log-jam which is rapidly developing consideration may go over until Fall.

The mining industry has for years vigorously resisted the principle of Federal control and policing of local stream pollution problems now contained in this bill. Under the measure as reported, the Surgeon General is directed to establish "reasonable standards of cleanliness" for navigable waters and "reasonable minimum requirements as to the treatment before discharge" of any waste or other substance "which is or may be injurious to human health or to any form of life or which would impair in any manner the utility of such waters for navigation purposes." In another section, "Congress hereby declares the discharge or deposit, directly or indirectly, of any waste or other substance . . . . which is or may be injurious to human health or to any form of life . . . . or impairs in any manner the utility of such waters for navigation purposes . . . . in violation of regulations prescribed by the Surgeon General . . . to be against the public policy of the United States and to be a public and common nuisance." Action may be brought in Federal courts to prevent or abate any such "nuisance."

In general the measure establishes under the Surgeon General of U. S. Public Health Service a program of pollution prevention, under which he is directed to encourage cooperative activities by the States. He is also directed to request District Attorneys to bring actions to prevent or abate discharge of waste only after interstate, State, and local authorities have failed to act within six months after receipt of this notice. No action is to be brought under the Act within two years after date of enactment, and if it is found impracticable for any industry or municipality to comply with the requirement, the Surgeon General shall not cause action to be brought during the period of time, not in excess of five years, required to construct necessary treatment works or to provide other adequate means of disposal.

Beautiful colored silver, cobalt and nickel oxides coat ceiling of stope in Aguanico mine into which Willis St. Clair is driving drill. Oxides are base of cobalt dyes and paint pigments

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Personals

R. L. Dean, who was general superintendent at Baxter Springs, Kans., for the St. Louis Smelting & Refining Company has returned to his position as executive assistant to E. H. Snyder, president of Combined Metals Reduction Company of Salt Lake City, Utah.

Dr. Louis C. McCabe, an authority on the mining, preparation and properties of coal, has joined the Bureau of Mines staff as chief of the Coal Division in the Fuels and Explosives Branch.

In his new position, with headquarters in Washington, D. C., Dr. McCabe will supervise the bureau's research on the mining, preparation, carbonization, and gasification of coal and kindred subjects at the Bureau's experiment stations and pilot plants in various parts of the country.

Robert C. Hills, formerly metallurgical manager of Nicaro Nickel Company, has been appointed as the technical assistant to the president of the Freeport Sulphur Company.

Jack C. Kinnear, vice president of the Southwest Division of Kennecott Copper Corporation has been reelected president of the Nevada Mine Operators Association.

C. Fred Henne of Scranton, Pa., former associate editor of the Scranton *Times*, is now with the Anthracite Institute at Wilkes-Barre where he will work on industrial problems dealing with production and labor conditions.

Merrill E. Shoup, president of the Golden Cycle Corporation has been appointed to the board of trustees of Colorado College at Colorado Springs.

Announcement has been made by Consolidation Coal Company that **R. D. Patterson** has been appointed superintendent of its Mine No. 98, Nora, W. Va., effective March 16. Patterson has had extensive experience in various phases of the coal mining field, having been connected with the industry for the last 20 years.

Other changes in Consolidation include the promotion of **Burl G. Steele** to section foreman of Mine 25, at Pinnickinnick. **Robert M. Eleyette** was named section foreman at Mine 32, Owings, W. Va.

The appointment of **Herbert G. Moulton** as consulting engineer to Patino Mines & Enterprises Consolidated, Inc., and its Canadian subsidiary, Patican Company, Ltd., has been announced. It is expected that he will be proposed for election to the

board of directors of Patino Mines and its subsidiary at the annual meetings on May 28, 1946. Moulton, a native of Idaho, is widely known in the engineering field, chiefly in the mining and smelting and railroad branches. After three years of army service as a lieutenant-colonel and colonel, Mr. Moulton joined Blyth & Co., Inc., as a vice president on March 1, 1946, which connection he will continue.

Dr. Harold J. Rose, vice president and director of research of Bituminous Coal Research, Inc., has announced the appointment of **William S. Major** of Philadelphia, Pa., as development engineer for the national research agency of the bituminous coal industry. Well known in the power field after 20 years of service with American Engineering Company, manufacturers of industrial stokers, Major will be responsible for promoting various BCR research projects that have progressed far enough to justify commercial trial or use.

Neil O'Donnell has been elected executive vice president of the Idaho Maryland Mines Corp. at Grass Valley, Calif. The Idaho Maryland is reputedly the second largest underground gold operation in the United States.

Lewis E. Young, mining engineer, announces the new location of his office, 423 Oliver Bldg., Pittsburgh 22, Pa.

L. D. Osborne, who has been superintendent of the Pacific Coast Borax Company plant at Boron, Calif., for the last 20 years, has been transferred to the company's offices at Los Angeles. **Claude Grimm** will succeed him as superintendent of the properties at Boron.

The M. A. Hanna Company announces the appointment of **W. A. Maier** as director of purchases, with headquarters at the principal office of the company in Cleveland, Ohio. For the past four years Mr. Maier has been serving the company in a number of special assignments connected with the war effort.

The position of assistant director of purchases will be taken over by **Morris A. Bradley**, who returns on terminal leave from the Philippines as a Major in the United States Army Air Corps, after four years in the armed forces.

The position of coordinator of purchases for the Hanna Coal Company, a 100 per cent subsidiary of The M. A. Hanna Company, will be taken over by **John Fielding, Jr.**, with headquarters at the principal office of the company, Cleveland, Ohio.

Elton A. Youngberg, formerly with the State Department of Geology and Mineral Resources at Grant's Pass, Oreg., has resigned to take a position with Howe Sound Mining Company at the Holden Mine, Lake Chelan, Wash. Youngberg has been succeeded by Hollis M. Dole, who has recently left the Navy after three years in the South Pacific.

Jerry Sabin, advertising manager of the Colorado Division of CF&I, has been appointed director of advertising for the Colorado Fuel and Iron Corporation, all divisions and subsidiaries, according to an announcement by E. Perry Holder, president. Mr. Sabin was first employed by CF&I in June, 1926, as sales promotion worker in the field division. Later he became assistant manager of advertising and in 1931 was promoted to manager. He will continue to maintain headquarters in Denver.

J. R. Davies of Boise, Idaho, is in charge of the development work now underway at the Red Cloud quicksilver mine in northern Jackson County, Oreg.

Henry W. Lowe, former director of personnel of the Carnegie Illinois Steel Corp., in Charleston, W. Va., has been appointed supervisor of employment and training for the Island Creek Coal Co. at Holden, W. Va. Mr. Lowe was recently released from the Army.

Stephen R. DuBravac of Ely, Nev., will be stationed at Las Vegas as deputy mine inspector for the state of Nevada. DuBravac was formerly employed by the Consolidated Copper Company at Kimberly, Nev., and also by the U. S. Bureau of Mines. He replaces **Mervin J. Gallagher** who will become foreman for the Consolidated Chollar Gould and Savage Mining Company at Virginia City, Nev.

John Payne, Jr., formerly of Reno, has been released from the Navy and has returned to his position as geologist with the American Metal Company at their New York office.

Ian L. Reid has been appointed chief engineer of the Oliver Iron Mining Co. for its operations on the Vermilion iron range with headquarters at Ely, Minn. Reid, who has just been discharged from the United States Army, is replacing **W. P. Wolff** who, earlier in the year, was transferred to Hibbing, Minn., as chief engineer on the Mesabi iron range.

William (Bill) Stapleton has been made superintendent of Consolidation Coal Company's Mines Nos. 206, 206-B and 207 of Dunham, Ky. During his 14 years with Consolidation, Mr. Stapleton has served in many different capacities having started work as a coal loader. These mines, together with Mine No. 204, have formerly been under the supervision of **M. E. Prunty**, Jenkins, Ky., who will continue as superintendent of 204.

George W. Danehy of Reno has gone to Central City, Colo., to reopen the old Pittsburgh mine which has been closed since 1943. Danehy was formerly metallurgist, and later chief engineer, with Tonopah Belmont Development Company in Tonopah and has been operating mines in Nevada, Arizona and Colorado for many years.

James D. Francis, president of Island Creek Coal Co., will continue to represent the natural resource industries on the directorate of the U. S. Chamber of Commerce. Mr. Francis' candidacy was unopposed and due to his familiarity with the coal mining industry, it is considered that he is unusually well qualified for this position.

Vincent N. Burnhart, is now in charge of contract diamond drilling for E. J. Longyear & Co. Burnhart was formerly a major in the United States Army and has recently been released from the service.

Fred Reiser, Jr., Cincinnati district manager for the Industrial Division of Timken Roller Bearing Company since 1944, has been named division manager for all divisions of the company there, including Industrial, Steel, Automotive, and Service-Sales.

Raymond D. Satterley has been appointed assistant general superintendent of company iron mines of the Inland Steel Co., Iron River, Mich. Mr. Satterley was formerly superintendent of the Sherwood iron mine, operated by the same company.

Donald L. Masson has been appointed assistant professor of mining at the school of mineral industries, State College of Washington, Pullman, Wash. Mr. Masson was formerly in the employ of the Cia. de Real del Monte y Pachuca in Mexico.

Harold B. Wickey has joined the engineering staff of Consolidation Coal Co. at Fairmont, W. Va. Mr. Wickey was former chief of the coal section of CPA. **Harold Montag** succeeds Mr. Wickey at CPA.

A. L. Burgen formerly mill superintendent for Calumet & Hecla, has retired after 57 years of service with the firm. During the period of Mr. Burgen's connection with the company, the Ahmeek mill and the Tamarack reclamation plant were erected.

On April 15 **Frank B. Dunbar**, general manager of the Mather Collieries of Pickands, Mather & Co., Mather, Pa., announced his retirement. Mr. Dunbar has been general manager of these operations since 1929. In the past he has been associated with many technical organizations and civic associations including the Coal Mining Institute of America of which he was at one time president. Mr. Dunbar has had an unusual safety record; in his 45 years of mine operations there has never been a single fatality caused by mine fire or explosion in any operation under his jurisdiction.

Roger I. C. Manning has been appointed field engineer for the Arizona Department of Mineral Resources in Tucson. He is replacing George A. Ballam who is returning to private practice in Tucson.

At a meeting of the board of directors on April 17, **Ralph Wann** of Canon City, Colo., was elected a director of the Colorado Fuel and Iron Corporation, Denver, Colo.

Homer W. Northrup, formerly with the Melting Department of the Iron and Steel Foundry Division of the Crane Company at Chicago and at its plant in Chattanooga, Tenn., has recently joined the Chicago Technical Section of The International Nickel Company, Inc. He will be associated with the foundry activities of INCO in the Chicago territory.

Charles P. Hoy of St. Louis, Mo., former traffic commissioner of the Fifth and Ninth Districts Coal Traffic Bureau and Traffic Manager of Belleville Fuels, Inc., retired on March 31 after 27 years of service. Mr. Hoy represented the coal operators of the Belleville and DuQuoin Rate Groups in matters pertaining to coal traffic.

— *Obituaries* —

Roy Miller, 63, of Corpus Christi, Texas, died at Johns Hopkins Hospital in Baltimore, April 28. Mr. Miller was a former mayor of Corpus Christi, a newspaper publisher, and was active in state and national political circles. Long active in the development of inland waterways, Mr. Miller constantly championed the protection and advancement of the natural resource industries in national affairs.

Victor C. Alderson, 83, former president of the Colorado School of Mines from 1903 to 1913, and later from 1917 to 1925, died at La Jolla, Calif., at the end of February. Mr. Alderson had an extensive mining engineering practice as a consultant and a great deal of experience in mine executive positions.

George P. Tweed of Duluth, chairman of the First and American National Bank of Duluth died on April 30 at the age of 75. Mr. Tweed was one of the early pioneers in iron mining in the Mesabi iron range. He was associated with A. B. Coates of Virginia, Minn., in the firm of Coates & Tweed. This firm discovered the Plymouth orebody near Wakefield, Mich., on the Gogebic iron range by diamond drilling just before 1912. The York Iron Mining Company which operates the York iron mine, was headed by Mr. Tweed.

Harry A. Guess, 70, vice president in charge of mining operations and explorations of the American Smelting and Refining Company, died Thursday, April 11, at his home, Forest Hills, Queens, N. Y.

Mr. Guess had been associated with A. S. & R. since 1901. He became a vice president in 1917. He was a director of other firms, including the Revere Copper and Brass Company, Inc., Federal Mining and Smelting Company and the General Cable Corporation. He was chairman of the board of Big Bell Mines, Ltd., in Australia.

Arthur Smith Dwight, co-inventor with the late R. L. Lloyd of the Dwight-Lloyd sintering process, died April 1 at his home in New York. This process which was invented in 1909 revolutionized sulphide ore sintering. Mr. Dwight was president of the Dwight and Lloyd Sintering Company and the Dwight and Lloyd Metallurgical Company and at the time of his death was 82 years of age.

NEWS and VIEWS

WAITING FOR LEWIS

Some three thousand coal cars, all empty, await termination of the coal strike at Williamson, W. Va., center of one of the nation's richest bituminous coal fields. Loaded, these cars would hold approximately 150,000 tons of coal. Converting U. S. industry used 1,000,000 tons of bituminous coal daily before strike

—Hamilton Wright Photo.

Eastern States

Utility Anthracite Installation

The Anthracite Institute *Bulletin* reports that the new Jennison Station of New York State Electric and Gas Company at Bainbridge, N. Y., is using the two largest traveling grate stokers ever installed in a utility plant. These stokers are each 24 ft. wide by 28 ft. long with 672 sq. ft. of grate surface installed in 200,000-lb. boilers operating at 650 lbs. pressure. These grate stokers burn No. 4 buckwheat anthracite. The entire plant was ready for operation in the record-breaking time of 17 months after ground was broken.

Methane Alarm Systems

Pennsylvania State College in its bulletin, *Mineral Industries*, for April, discusses the continuous methane alarm and the continuous methane recorder. As regards the methane alarm, the device described is entirely automatic in operation and uses the same principle for the detection and analysis of methane as the portable methane detectors and indicators; namely, the unbalancing of an electric circuit due to the burning of the gas on a platinum filament which is coupled within the circuit. The alarm can be set to ring upon any predetermined percentage of methane between 0.5 and 1.5 per cent. Once the alarm begins to ring, it continues to do so until the methane content of the air has dropped below the predetermined percentage, or until the alarm bell is switched off by turning the instrument on its side, or removing the instrument from the gaseous area. Methane recorders are not new in coal mining but the latest type is accurate and dependable. A continuous methane recorder operates on a somewhat similar principle by the use of a heated platinum wire filament. The percentage of methane in the air is recorded on a chart and also indicated continuously on a meter. Accuracy is independent of changes in temperature, humidity or barometric pressure. The chart range is usually from zero to 2.0 per cent.

Flood-Prevention Bulletin at Anthracite Mines

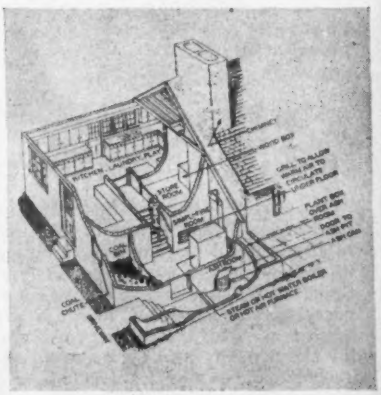
The U. S. Bureau of Mines has recently issued a new bulletin on Flood-Prevention Projects at Pennsylvania Anthracite Mines. This bulletin is No. R. I. 3868 and is a report of investigations by S. H. Ash and James Westfield. The report is the result of a preliminary investigation in the anthracite region and was undertaken by the Department of Interior through the Bureau of Mines. It describes investigative work conducted during the period of July 1, 1944, to June 30, 1945. The investigation included instruction of four mine flood-prevention projects. The bulletin is illustrated with diagrams and cross-sections as well as numerous photographs and the accompanying data illustrates very conclusively some of the problems of flood control.

Dr. R. R. Sayers, Director of the Bureau of Mines, recommends a co-operative flood-prevention program for the anthracite field in Pennsylvania and points out that such a program would definitely increase the life of the coal mining in the region.

New House Heating Design Uses Anthracite

The Anthracite Institute on April 9 presented a series of plans for six "Answer Homes" featuring a new utility heating room designed to cut home building costs and to provide more economy, convenience and comfort in the use of anthracite heat.

The heating room, which the Institute has named a "Simpli-Fire" room, and to which it has given its seal of approval, was aimed primarily at



eliminating the expense of full-basement construction while retaining the desirable features of a basement heating plant and adequate space for coal storage.

At the same time, however, the room is so arranged that ash-shoveling is eliminated entirely. Ashes drop below floor level into a small, easily handled container directly under the furnace or boiler. No ashes ever get into the house, for the container is removed from the outside through a small door in the lower wall of the heating room. The container may then be left inconspicuously in a sunken areaway, sheltered and concealed by an attractive flower box.

Institute Sees Miniature Mining Machine

Approximately 100 people who attended the regular monthly meeting of the Central West Virginia Coal Mining Institute at the Waldo Hotel in Clarksburg, Friday evening, April 12, 1946, saw a miniature model coal cutter and loader which the inventor, Clarence E. Brown of Clarksburg, believes may revolutionize the coal industry. Mr. Brown told the Institute that his machine could eliminate the physical dangers of those operations and improve the quality and volume of the coal produced by any mine. It is estimated that the machine will cut and load over 3,000 tons of coal per shift in the Pittsburgh seam. Brown is an employe of the Dawson Coal Company, Clarksburg, W. Va.

Mine to be Mechanized

Consolidation Coal Company has announced that its Mine No. 98, at Nora, W. Va., is being mechanized with new dumping facilities provided and it is expected the daily capacity of this mine will reach 2,000 tons. This mine will be under the supervision of R. D. Patterson, recently appointed superintendent.

Meeting of Coal Mining Institute

The West Virginia Coal Mining Institute will hold a meeting on June 14 at the Hotel Prichard, Huntington, W. Va. James E. Hart, of the Island Creek Coal Company, is chairman of the program committee and has arranged a most interesting program for the one-day meeting. Amos Culp is chairman of the arrangements and entertainment committee.

Nursing Service for Coal Miners' Children

—Hamilton Wright Photo.

THE reduction by 50 per cent of the leath rate among children from 8 to 14 years old, and an equally heavy cut in the number of lost births among coal miners' wives, is the eight-year record of nurses employed by a bituminous coal company.

More than 6,000 coal miners' families benefit from the service, which was inaugurated 10 years ago as part of an effort by the company to raise the social and living standards of some 22 communities in Pennsylvania, West Virginia, and Kentucky. The nursing service offered is free.

"The West Virginia Health Department cooperates closely with any member of our nursing service who may be in a community near a public health unit," Mrs. R. T. Shirley, R.N., assistant supervisor of the three-state private nursing service at Beckley, W. Va., stated. "The West Virginia Public Health Department feels that our nurses relieve them of many duties which they would not be able to handle, as their staffs are greatly overworked."

In Pennsylvania, beginning with only one nurse who traveled from one mining community to another, the private nursing service has grown to 16 full-time registered nurses and 1 nurse supervisor.

"Perhaps the best clue to the great strides we have made in so short a time is the fact that our nurses come from the coal fields and understand the miners," Mrs. Shirley said, adding that all nurses under her supervision had been trained in hospitals in the bituminous coal mining areas. "What better way is there of learning the habits and personalities of people than nursing them through three years of training?"

L. E. YOUNG
Consulting Engineer
Mine Mechanization
Mine Management
Oliver Building Pittsburgh, Pa.

PETER F. LOFTUS
Consulting Engineers
ENGINEERING AND ECONOMIC SURVEYS, ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY
Oliver Building Pittsburgh, Pa.

Home hygiene classes are a part of each nurse's work in the 22 bituminous coal mining communities. In the past six years about 50 per cent of the women enrolled have completed the course, which helps them to care for one another when there is an illness in the community, and to aid mothers following childbirth.

Courses in nutrition are re-educating the miners' wives in the matter of buying food, and in the preservation of foods without loss of vitamins and minerals.

Cooperating with the public schools, the nurses supply growth and health charts to the teachers, and daily cod-liver oil for all young or underweight children from October to April.

Coal Mining Courses to Be Given By School of Mines

The School of Mines of the University of West Virginia has announced that the 34th Annual Short Course in Coal Mining will be held from June 10 to July 20. The courses will be given at three points, first at the School of Mines itself, Morgantown; second at Mt. Hope High School, Mt. Hope, and third at Welch High School, Welch. The primary purpose of these courses is to provide training that will help ambitious and capable mining men to secure their certificates of competency as mine foremen and fire bosses in West Virginia. It is felt that the training of competent supervisory personnel will promote safe and efficient mining throughout the state. The courses are designed to be of value to the practical mining man and to supplement his experiences with a thorough knowledge of the technical principles involved.

At the close of the short course, the West Virginia Department of Mines will conduct special examinations for students desiring to qualify for their certificates. Veterans attending the short courses may apply for benefits provided for under public law 346 by filling out Veterans' Administration Form 1950 and mailing the executed form to the School of Mines at Morgantown. This form may be obtained from any office of the Veterans' Administration or by written request to the School of Mines or from any mining extension instructor. These applications should be filled out as soon as possible.

New Sillimanite Deposit Discovered

State Geologist Jasper L. Stuckey, of North Carolina, has reported a discovery and investigation of extensive deposits of sillimanite and aluminum silicate within the state. The mineral occurs in a zone 10 miles wide and about 95 miles long, which starts at the South Carolina line, in Rutherford County, and extending northeast to Yadkin River, near Elkin. Dr. Stuckey says he knows of no similar deposit as large as this except some in Georgia, where the mineral is being used to considerable extent. This mineral may be of great use in the manufacturing of refractories and other materials where high resistance to heat and chemical attack is desired. At the present moment tests are being made on the North Carolina material at the TVA laboratory of Muscle Shoals. Although sillimanite has been known to exist in North Carolina for a great many years, it was not until 1943 that Charles E. Hunter, of TVA, discovered outcrops near Valdose. The study estimates that perhaps 15,000 to 20,000 tons of the mineral might be utilized annually at a probable cost of $20 to $35 per ton and the ore studies in the survey run approximately 25 per cent concentrated mineral.

Government Acid Plant Purchased by Tennessee Copper

A Government sulphuric acid plant built at Copper Hill, Tenn., during the war will be purchased by the Tennessee Copper Company at Copper Hill, Tenn. The War Assets Corporation has accepted the offer of the Tennessee Copper Company and it is expected that this transaction will be completed very soon.

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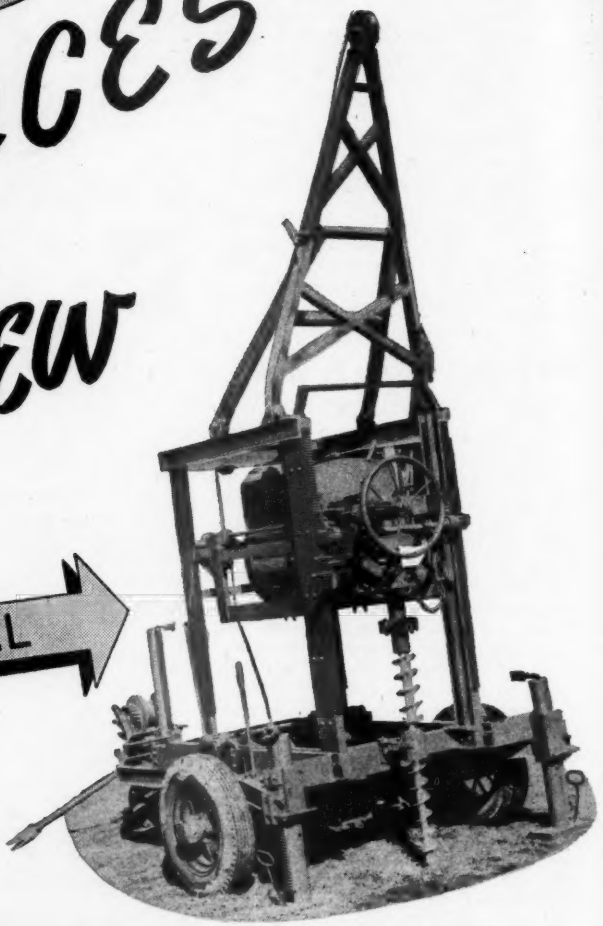

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Central States

1944 Coal Production

Rail shipping mines in Indiana produced 24,375,000 tons of coal in 1945, according to a statement released by the Coal Trade Association of Indiana, based on reports made to that organization. Of this tonnage, 13,375,000 tons were produced by 44 strip mines and 11,000,000 by 33 shaft mines. These figures do not include truck mine production, which is estimated at 1,125,000 tons, making the total estimated for 1945 25,500,000 tons. C. C. Lydick, managing director of the Coal Trade Association, stated that "Indiana producers got off to a good start in the first quarter of 1946 with production exceeding that for the same period of last year. The demand for Indiana coal will continue to remain high. What our state will produce this year depends, of course, on how soon production is resumed and continued operation thereafter." In 1944 Indiana produced 27,961,883 tons of coal, which was the largest since 1920, when production exceeded 29,000,000. The greatest tonnage ever produced in the state was in 1918, when the high was 30,678,634 tons.

Summer Meeting Illinois Mining Institute

The twenty-sixth annual boat trip and summer meeting of the Illinois Mining Institute will take place on Friday, June 21, and the steamer *Golden Eagle* will leave St. Louis at 10.30 p. m. on this date and return to St. Louis Sunday morning, June 23. As space is definitely limited, members who desire reservations should write immediately to B. E. Schonthal, secretary-treasurer, Illinois Mining Institute, 28 East Jackson Boulevard, Chicago 4, Ill. Space on the boat will be reserved for members only.

Special Course in Atomic Energy

The Allis-Chalmers Manufacturing Co. of Milwaukee, Wis., in cooperation with the Illinois Institute of Technology, has begun to train its personnel on the subject of atomic energy. Special graduate courses are being given at the Illinois Institute of Technology for Allis-Chalmers employes in order to introduce them to the elements of atomic physics. The course started on March 8 and will last for 16 weeks. Many eminent physicists who participated in the recent development of nuclear-fission will teach at this course. Allis-Chalmers is conducting a very comprehensive training program for the benefit of its employes and since 1944 graduate courses have been offered by the Illinois Institute of Technology leading towards the degree of Master of Science.

Proceedings of the Illinois Mining Institute

The annual proceedings of the Illinois Mining Institute have been published for the year 1945. This is the fifty-third year of the Institute and the proceedings give a comprehensive account of the activities of the organization throughout the year. Numerous excellent papers are printed in the proceedings as well as a list of membership and the annual reports for the year. Copies may be secured by writing B. E. Schonthal, secretary, Illinois Mining Institute, 28 East Jackson Boulevard, Chicago 4, Ill.

Strip Mining Digest

The Ohio Coal Association has recently published a brief bulletin entitled "Strip Mining Digest." For those interested in the study of reclamation, this digest is a thorough and comprehensive booklet embracing the subject of strip coal mining in the state. As the index of this booklet indicates, practically every phase of open cut or strip mining of coal in Ohio is touched upon. Fourteen different authors write on subjects dealing with the legal aspects, the economic, the problems of reforestation, the problems of soil conservation, water control, and the effect upon public health. As strip mining in Ohio is now a 40-million-dollar annual business, it can be seen that this topic is one of great importance to the state as well as the coal mining industry. The booklet answers many questions that have undoubtedly occurred in the minds of those interested in strip coal operation and consequently is a valuable contribution to the better understanding of the problems involved.

Early Iron Ore Shipments Down

The Lake Superior Iron Ore Association reports only 729,902 gross tons of iron ore shipped from lake ports during the month of April. This was the opening month of the season as there were no shipments in March and represents a very low start in iron ore shipment as in April, 1945, the total was 7,282,074 gross tons. In 1943 an all time record was set for the same period with 8,649,708 gross tons. The iron ore strike in the Lake Superior region has undoubtedly accounted for this slow start in shipment. It is understood that negotiations are under way at the present between members of union and officials of the various iron mining companies.

Mica Production from Old Mike Mine

Mineral Mills, Inc., reports steady production from its Old Mike mine and scrap-mica plant near Custer, S. Dak. At the present between 150 and 200 tons of material are handled daily and about one carload of finished product per week is working in the mill. A. I. Johnson, of Keystone, S. Dak., is president and Benjamin Bell, of Custer, S. Dak., is superintendent of this operation.

Wanted

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Address all replies to Box "C," in care of this publication.

College of Mines Planning Extensive Summer Field Trips

Advanced students of mining engineering and allied subjects at the Michigan College of Mining and Technology will take extensive summer trips of six weeks' length alternately to the Rocky Mountain areas and to the Canadian mining regions. A very comprehensive program is planned, including inspection of the Mesabi and Vermilion Ranges of Minnesota, as well as trips to the Black Hills, Utah, Wyoming, Colorado, and the Tri-State District, as well as the southern Illinois coal fields. In 1947 trips will be made to the copper, nickel, and gold regions of Ontario and Quebec, as well as Pennsylvania coal fields and Tennessee zinc and copper mines. Prof. J. Murray Riddell is in charge of the trips, which will be open to all who have completed at least their junior year. Since Professor Riddell took over the directorship of the mining department last fall he has been successful in expanding the staff of the mining department and the projected field trips are part of a more comprehensive plan which has been devised to give students more practical insight into mining in the field.

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Lead and Zinc Property Examined

The Point Cedar lead and zinc mine in Clark County has been examined by the Baroid Sales Division of National Lead Company. The results of the preliminary investigation have not been made public but it is understood that if further examinations are satisfactory, the company will operate the property. The Point Cedar is a lead and zinc property.

New Plant Completed

Four Mile Mining Company is scheduled to start operations at a new mill on Four Mile Creek, 6 miles west of Picher. This mill will handle between 15 and 20 tons an hour. A new shaft was completed several months ago to a depth of 225 ft. at the mill site and mine operations will take place on this level. Van Walters and associates are interested in this company.

Washing Plant Now Operating

A washing plant or scrubber on the 60-acre crown crest tract, just east of Duenweg, has been completed and is ready for operation. This plant has capacity of 50 tons of ore an hour from the company's strip pit on the acreage and will remove clay, mud, sands and other waste materials. Concentrates from the washing plants will be trucked in large built trucks to the company's Sciota mill, east of Webb City, which has been reconditioned.

New Shaft Being Sunk South of Picher

Floyd W. Gooch, of Joplin, Mo., reports that Evans-Wallower Zinc, Inc., is sinking a new shaft on the company's property south of Picher. The new shaft has been designated as No. 16 and has been contracted to Reynolds & Soulen. The present shaft is being sunk to a depth of about 160 ft. on the basis of churn drilling and exploration work undertaken several years ago, according to Gooch, who is general manager of the property. Ore will be trucked to the company's No. 4 mill once the development work is completed.

Congress Presented with Tri-State Brochure

A brochure entitled "The Conservation of Tri-State Ore Reserves" has been prepared under the direction of O. W. Bilharz, president of the Tri-State Zinc and Lead Producers Association, for presentation to Congress. The purpose of the brochure is largely to inform the national legislators as to the problems facing zinc and lead producers. The brochure includes a description of the Tri-State district and presents a history of the region as well as indicating important statistics concerning future ore reserves and economic factors affecting mining in the Tri-State area.

Churn Drilling Completed

The United States Bureau of Mines has completed churn drilling and field work at the Alice mine in Ozark County, Mo. The existence of zinc ore below the water table was definitely established by this work and by additional exploration by the owners of the property.

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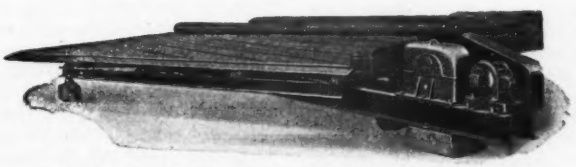

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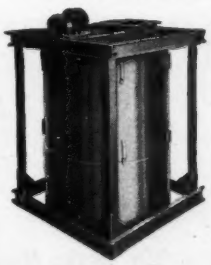

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Western States

Resurrection to Reopen

The U. S. Smelting, Refining & Mining Company, the Hecla Mining Company, and Newmont Mining Company have combined to reopen the Old Resurrection mine, located in Evans Gulch, at Leadville, Colo. In 1939 mining operations were started at the No. 2 shaft of the Resurrection, located at the head of Evans Gulch. The shaft was repaired and extended to include five stations and levels. The Yak Tunnel, which penetrated the property located on Iron Hill, Breece Hill, and the head of Evans Gulch, was purchased and put in condition in 1941. This tunnel provided drainage, haulage, and ventilation for the mining operations. Construction of the present Yak surface plant began in 1941 and consists of machine shops and compressor installation as well as warehouses, oil houses, assay offices, a timber yard, mine office, and mill. The ore is hoisted to a pocket above the 800 level, from which it is loaded into the Yak train, and 7½-ton Jeffrey trolley locomotive pulls a 14-car string of 50 cu. ft. Grandby-type cars through the tunnel. The trolley motors are powered by the 250 DC trolley wire, which is connected to generators set at each end of the tunnel. The present mill on the Resurrection property has a rated capacity of 700 tons of lead-zinc ore a day. A 300-ton flotation mill was constructed in 1941 and operations started in 1942. An additional 400-ton unit was added in 1943 and placed in operation in January, 1944.

Mines Resuming Activities in Cripple Creek

Recent weeks have seen increased activity in the Cripple Creek district and numerous mines have resumed operations throughout the months of March and April. Some of the mines resuming operation since the end of the war are the El Paso, Commonwealth, Jo Dandy, Wild Horse, Jerry Johnson, Pinto, Proper, Shurtloff, Flying Cloud, Orpha May, Glorietta, Anaconda Tunnel, Anaconda Winze, Moffatt Tunnel, Smith-Moffat, Saunders Shaft, and Trail Tunnel. The Portland mine now has 16 sets of lessees, twice the number that it had on March 1, 1945. In addition, the Vindicator and Ajax report an increase in the number of lessees and the Colorado Springs mining firm, Company Mines, Inc., has begun extensive sampling and exploration east of Cripple Creek on the Globe Hill properties of the Stratton-Cripple Creek Mining and Development Company and the Iron Clad Hill propertries of Thomas Kavanaugh.

Placer Mining to Resume at Breckenridge

Placer mining activities in the Breckenridge district have been halted for more than 20 years by litigation. With the settlement of an important lawsuit pertaining to this area, mining will be resumed between Dillon and Fairplay and throughout the Breckenridge district, starting this month. One dredge in the French Creek holdings is expected to handle more than 2,250 yds. a day and it is anticipated that gold production may reach approximately $30,000 per month. Edward Cooper, with a new dredge that has recently been purchased, will be the first to start operations in the district.

Exploration for Zinc and Lead

Operators in the Bayard district of New Mexico have started extensive exploration for zinc and lead deposits. New leases have been acquired and exploration and development so far have proved promising for future production.

Meeting of New Mexico Miners and Prospectors Association

THE 1946 annual meeting of New Mexico Miners and Prospectors Association took place on April 20-21, at Albuquerque, and a new attendance record was set in the two-day business session, which considered post-war problems in one of the state's major industries. Presiding over the meeting was Horace Moses, Association president and general manager of Chino Mines Division, Kennecott Copper Corporation. In his address Mr. Moses lauded the mining industry for its major part in aiding victory in the war by metal production for armament and other war needs. He gave full credit to the employes of the mines and reduction plant that made possible an uninterrupted flow of vital metals.

Other prominent men who addressed the meeting were: James K. Richardson, of Salt Lake City, Utah, who represented the Utah Metal Mine Operators Association, and the subject of his address was "Management's Role in Labor Relations"; Ira L. Wright, M. Huntington, G. A. Warner, H. E. McCray, A. F. Henderson, Ralph H. Wilpolt, B. W. Jarboe and J. M. Campbell also spoke on various technical subjects of interest to the Association. John E. Miles, former governor and at present New Mexico Commissioner of Public Lands, spoke on state land policies, and Charles F. Willis, representing the Arizona Small Mine Operators Association, discussed various problems of the mining industry.

Annual reports were submitted by President Moses, Treasurer R. M. Twiss and Secretary R. H. Downer, and judging from these reports, the Association is a strong and active organization. Senator Dennis Chavez and Carl Wilken, economist, Wash-

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ington, D. C., also addressed the meeting.

More than 300 people attended the banquet, dance, and floor show which was staged by the Association and the Albuquerque Chamber of Commerce, which handled many details of the meeting.

Spiral Concentrator at Park City

Preliminary operations at Park City indicate that large tonnages of mill tailing located on the flats below town can be treated successfully with the Humphreys spiral concentrator. It is reported that crews in the employ of the Pacific Bridge Company of San Francisco are preparing to treat the ground for zinc lead tailing with these concentrators, which were used very successfully during the war period on chromite sands in Oregon and more lately on iron ores.

New Majestic Mining Company Listed on Salt Lake Exchange

The Governing Board of Salt Lake City Stock Exchange has announced that the application of New Majestic Mining Company for listing on Salt Lake Exchange has been approved. The New Majestic is located in the Star mining district, in Beaver County. Three different claim groups comprise the operation and the company has been producing ore for some time past from the Old Harrington Hickory mine and it is reported that considerable reserves have been blocked out for shipment. The firm also controls the Vicksburg and Hoosier Boy properties.

New Park Mining Reports 1945 Earnings

The New Park Mining Company, located at Keetley, showed improved earnings during 1945 in spite of a reduction in tonnage and income compared with 1944. Due to the manpower shortage, tonnages were decreased throughout the season. Operating expenses were reduced by $63,094 as compared with 1944.

Montana's Chromite Reserves

More than 5,000,000 tons of low-grade chrome ore is reported by the United States Bureau of Mines as existing in Montana's Stillwater and Sweetgrass Counties. The deposits are located in the belt from 1 to 5 miles in width and 30 miles long in the northeastern margin of the Beartooth Mountains. A process for beneficiating these ores was developed by the United States Bureau of Mines during the recent war.

Known as a "roasting and leaching" process, it involved heating the chromite with carbon in a rotary kiln to reduce the ore's iron content to a semi-metallic state. In this form, the iron becomes soluble in dilute sulfuric acid and much of it thus can be removed, leaving an insoluble residue enriched in chromium. Due to the expense of processing, these deposits are not competitive with high-grade imported ores in normal times. Details on these ores are covered in report of investigation 3834, "Beneficiation of Montana Chromite Concentrates by Roasting and Leaching." Copies may be obtained by writing for this bulletin to the United States Bureau of Mines, Department of the Interior, Washington, D. C.

Ore Production Started for Test Run

The Green Mountain Mining Company, near Dixon, Mont., has installed and is operating a new air compressor and has started production of ore for a test run in a new 50-ton milling plant which has just been completed. According to Earl F. Elstone, manager of the Green Mountain Mining Company, about one-fourth of the ore broken is sorted and shipped direct to the smelter, while the balance is used for mill feed. Crude ore and concentrate are shipped to the Anaconda smelter and produces in values in copper, gold, platinum, and silver in dollar value in the order named.

New Low Grade Copper Deposit

A large low-grade copper deposit is located, as result of recent exploration in the San Manuel area, near the well-known Mammoth-St. Anthony mine at Tiger, Ariz. A large low-grade copper deposit has been revealed by exploration. San Manuel deposit is now owned by the Magma Copper Company and it has some features in common with other disseminated porphyry copper deposits, such as those that have been located of recent years and which have become of such great importance to the copper mining industry. This new discovery may prove to be one of the most important recent finds in Arizona, providing methods are worked out to secure the copper economically. The metallurgical properties of the ore are, at the present moment, not disclosed.

Music Mountain Mine to be Reopened

The Music Mountain mine, which dates back many years and has produced some very valuable ores in the past, is to be reopened shortly. This mine, located in Mohave County, was formerly operated by Leonard and Claude Neal and a contract has recently been negotiated with Leo Manson whereby Manson will take over the entire Music Mountain property beginning April 1. Mining equipment has already been moved to the property and present plans call for the erection of a mill at a later date.

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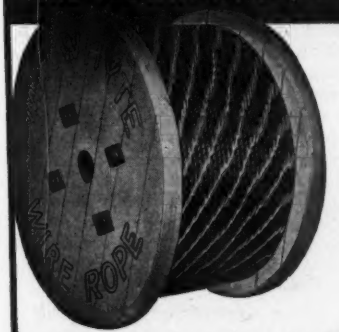

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Ward Mining Company Developing Operation Near Yuma

The Ward Mining Company is developing a fluorspar and lead property located at Sonora, not far from Yuma. Production at the Sonora mill at Yuma has been discontinued and the equipment being shipped to Sonora mine, where lead values are available. A flotation plant is to be installed later in order to extract acid-grade fluorspar from this property.

Silver Palace Mine Reopened

A report from Tonopah states that the Associated Mines Corporation has expended approximately $80,000 on the old Silver Palace mining property at Grantsville, 10 miles south of the old camp of Ione, in northern Nye County. The Silver Palace mine had a record of a production in the 1860's of more than five millions. The old workings are being dewatered and a good grade of ore is reported. The working force a month ago comprised 27 men. This type of operation is attracting people who wish to mine without extensive exploration in new districts. In the same vicinity is the old camp of Berlin, the larger mines of which are still owned by interests in New York.

New Tungsten Plant to Open

J. Ray Coulter, in charge of preliminary work of a tungsten processing plant for U. S. Vanadium at the Basic Magnesium plant at Henderson, in Clark County, says his company will be ready for full-scale operation by July 1. The bulk of the scheelite concentrate for the Henderson plant will come from the newly enlarged concentrator at the Riley mine, in the Potosi district, in Humboldt County, in the northern part of the state. It is reported that trucks have delivered approximately 150 tons of Riley mill concentrate to the southern plant.

Goldfield Property to be Reopened

The purchase of the hoist, compressor, and other machinery from the Jumbo Extension property at Goldfield is to be used in extensive exploration work on the Red Hill Florence Company holdings, according to W. J. Franks, manager of the operation. It is planned to put an old shaft in working order to the 500 level, where a large tonnage of low-grade gold and silver ore is said to be exposed. The Red Hill Florence grounds adjoin the rich Florence mine, well known during Goldfield boom days.

Nevada-Stewart Mining Co. Activities

Officials of the Nevada-Stewart Mining Company, in the Pine Creek area of the Coeur d'Alenes, report that the company has completed installation of a new compressor unit underground and has finished replacing light main haulage rail with heavy steel, preparatory to the production of zinc-lead ore. The vein on the property was diamond drilled last year by the U. S. Bureau of Mines. Results of this drilling were not made public at the time, but the company started to drive the lower tunnel to intersect the vein at the point indicated by the drill, with the result that the directors report a vein of good ore 12 ft. wide. The ore removed in the work now going forward will be stockpiled until some arrangement can be made for mill treatment. The company contemplates a merger with the adjoining Highland-Surprise mine, which has a 250-ton milling plant. This plant, however, is near capacity production on its own ore. If a merger of the two properties is accomplished, this mill probably will be enlarged.

Silver Activities East of Mullan

One of the most active sections of the Coeur d'Alene district at present is the new silver belt east of Mullan. Interest in this part of the district is occasioned by the development of the Lucky Friday mine, which has paid its own development and equipment expense out of a high-grade silver-lead ore body located between the Osburn and White Ledge faults. Since the Lucky Friday discovery, several other companies have been organized to develop properties along the strike of this mineralized zone. Two of these companies, the Hunter Creek to the east and Lucky Friday Extension to the west, are operating through the Lucky Friday shaft from the 1,400-ft. level. The Vindicator Mining Company, further east, is developing its own property through a lower tunnel, and the Idaho Silver Mining Company, adjoining the Vindicator on the east, is developing the Daisy property, a portion of the old Butte & Coeur d'Alene Mining Company holdings.

Sunshine Acquires Additional Claims

Sunshine Mining Company has acquired the Idaho-Aberdeen group of 19 unpatented mining claims on the strike of the Silver Syndicate vein and west of the Bunker Hill owned Crescent mining property. Conditions of the transfer are on a 50-50 profit operating basis, with Sunshine doing all the development work. This arrangement is similar to existing agreements between Sunshine, Polaris, Silver Dollar, Silver Syndicate, Sunshine Consolidated, Metropolitan and Big Creek Apex mining companies. Sunshine has recently opened a rich body of silver-lead ore in the western portion of Silver Syndicate ground. Width of this new ore body averages 4.2 ft. in about 200 ft. of drift work, with widths from a few inches up to 12 ft., and average mill feed assays over this distance show 64 oz. of silver and 22 per cent lead per ton. This ore body is approximately 3,500 ft. westerly from the rich ore body discovered along the strike of the same fissure in Polaris and Silver Dollar workings.

Salmon River Placer

The Crescent Pacific Mining Company of San Francisco has leased from the State of Idaho nine miles of territory along the banks of the Salmon River near Lucille, Idaho, and is preparing to dredge the ground for gold early this spring. The company is now assembling a dredge unit mounted on steel pontoons and capable of handling 1,500 tons of gravel daily.

Lead from Darwin Mine

The Anaconda Copper Mining Company is now producing approximately 1,500,000 lbs. of lead per month from the Darwin mine in California, which the company recently purchased from Arthur Theis and Shirley Parker, who discovered the Darwin ore body in a prospecting venture in which they had engaged to pass the time while their Boas gold mine at Norris, Mont., was closed by Government order.

Dredging Operations Resumed in Shasta County

The Thurman Gold Dredging Company has resumed placer operation on Clear Creek, in Shasta County, with W. J. Harvey as superintendent. A bucket line type dredge equipped with 9 cu. ft. capacity buckets is operating on the property.

High Grade Ore from El Dorado County

A 60-ft. winze which has finished in high-grade ore is reported by O. H. Griggs, manager and co-owner of the Lilyama mine, near Pilot Hill. Milling of this ore is now in process and a car of copper-gold concentrate is

ready for shipment to Salt Lake. The Lilyama operators are planning an extensive diamond drilling program as soon as the equipment is available for this purpose. Mrs. Fred McGill and E. L. Reeves are associated with Griggs in the operation of the property, business headquarters being at Placerville.

Milling Resumed at Tropico Mine

The Tropico mill has resumed operations near Rosamond, Calif., and is milling at the moment approximately 30 tons of ore per day. Production will be increased as more men become available. At the Tropico mine the main effort is being devoted to installing timbers and repair work. This mine has been closed for several years and prior to the war it was the largest gold producer in the Rosamond district.

Washington Clay Deposits

The United States Geological Survey has investigated six high aluminum clay deposits in King County, Wash. Some of this clay has definite possibilities for refractory use as well as source material for alumina. The deposits are located within 50 miles of Seattle and the aluminum plants at Tacoma.

Copper, Lead and Manganese Encountered

At the Golden Economy claim, formerly owned by Charles M. Lewis, near the head of Tiny H. Creek, Curry County, W. F. Crowell, of Medford, Oreg., has driven a shaft and encountered a 26-in. vein containing copper, lead, and manganese. Gold and silver values from $28 to $48 per ton have been reported from this property and a contract to sink a larger shaft on the claim has been let.

New Vein at Golden Fraction

A vein 7 ft. in width and having a high-grade streak containing iron and manganese oxides has been encountered at the Golden Fraction claim tunnel on the west fork of Mule Creek, in Curry County, Oreg. L. A. Damon has driven 200 ft. on this claim and over 550 tons of ore have been mined and are on the dump and reported to average an assay value of $12 to $15 per ton, excluding the high grade. Damon and associates are also working the Brown Eagle claim in the same district and an open cut is being driven to crosscut a high-grade vein on this property near the surface.

The Metal Subsidies

(*Continued from page* 51)

classes of premiums shall be non-cancellable unless necessary in order to make individual adjustments of income to specific mines.

This is identical with the provision which your committee incorporated in S. 502 a year ago, and hence does not call for extended explanation. In recommending this provision last year, the committee made the following comment in its report:

"It was felt that, without a specific authorization on a non-cancellable basis, producers and employes alike would be unable to plan ahead and this would react unfavorably on production. . . . As mining is dependent upon development work and development work will only be done if there is a specific guaranty of reasonable prices for a definite time, permitting the rules of the premium price plan in this respect to be changeable or subject to cancellation at the will of the executive agencies would make it impossible for the mining industry and particularly the small mines to plan ahead on a definite basis."

The reasoning thus put forward by this committee last year applies with full effect to the portion of the subsidy plan that will be continued under the McFarland bill. It is evident that there must be some subsidies so long as there are any ceiling prices, and these subsidies must be on a basis that permits mine producers to plan ahead for a reasonable period. This period must not be shorter than the period during which ceiling prices continue to be authorized. Without a non-cancellable feature the public economy will not enjoy the full benefits in the maintenance of production by marginal mines that the subsidy program is designed to provide.

Adjustments for Inequities

Two further provisions of the McFarland amendment are of great importance in the continuance of a modified subsidy program. Items (c) (1) and (c) (2), beginning at lines 8 and 11, page 2, require (1 that adjustments shall be made to correct inequities against the producer and to encourage exploration and development work, and (2 that costs shall include adequate allowance for depreciation and depletion.

This committee's report last year, in commenting on the extension of the Premium Price Plan "on the same terms as heretofore," stated that this "assures the continuance of the subsidy on basic standards which have been employed in the administration of the plan. It does not, of course, preclude changes designed to improve administrative procedure."

Notwithstanding this expression of intent, the administrators of the plan have recently taken the narrow view that this language barred them from making constructive changes in their work-sheets, methods of arriving at quotas and premiums, scale of operating margins, etc. As we have pointed out, these methods are unsound in various respects. They result in notable inequities against the producers, fail to give adequate reward to reduced costs and greater efficiency, and do not allow adequately for all-important exploration and development work. Depletion and depreciation are not allowed as costs, and the scale of margins does not make adequate allowance for them, especially in ores containing precious metal values.

The inconsistencies and inequities in the present formulas have been explained to OPA officials, who contend that they are powerless to correct them under the existing law, which prescribes "the same terms as heretofore." It is essential that Congress now clarify this phrase, to permit and to require that the necessary corrections in administration of the plan be made.

Conclusion

For the portion of industry represented by non-ferrous metals, we wish to emphasize the pressing need for action by Congress to insure that the coming year shall be a period of transition back to the sort of economy under which our country has prospered.

Production of lead, copper and zinc is urgently required in the reconversion and construction programs. The McFarland amendment will help remove the shackles on production—the artificially low ceiling prices and the inequities of the subsidy plan—and will shift a substantial part of the cost of production from the taxpayer to the purchasers of articles containing these metals. Now that the Government is no longer the principal purchaser fairness requires that this shift be made.

Lead, copper and zinc, having been singled out for unique and special treatment, require legislation of the character of the McFarland amendment. If the entire non-ferrous metal industry is not to be subjected to indefinite administrative control, it is essential that this amendment be made a part of the present bill.

MANUFACTURERS FORUM

Marion Steam Shovel Company Changes Its Name

It has been announced that the Marion Steam Shovel Company has changed its name to Marion Power Shovel Company. As the largest portion of Marion production during recent years has been diesel, gasoline and electric power shovels the new name is more appropriate. The first Marion electric shovels were designed in 1909 and by the 1920s the Marion Company was producing almost as many electric, gasoline and diesel machines as steam engines. At the present moment the Marion Power Shovel Company is modernizing its plant and in the midst of purchasing new equipment and machine tools.

New Totally Enclosed Fan-Cooled Motor

A new totally enclosed fan-cooled motor especially designed for use in extremely dusty, dirty, and corrosive atmospheres has been added to the line of General Electric Tri-Clad induction motors. The new motor is available in standard, explosion-proof, and dust-explosion-proof types from 1 to 1,000 hp. and can be used where iron dust and metal filings are in the air and in Class I Groups C and D and Class II Groups E, F, and G hazardous locations. Short in length and compact in construction, the motor can be installed in a small space, making it suitable for machine tool applications where the motor must be part of the driven machine.

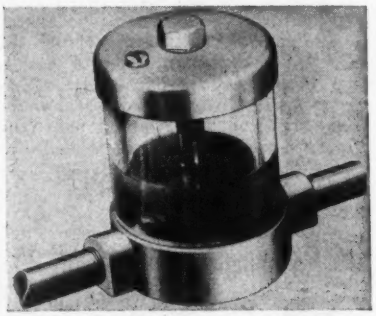
The new Tri-Clad features a double-shell, cast-iron frame, and cast-iron end shields and conduit box for protection from external blows, dripping water, dusts, vapors, and corrosive liquids. Sealed end shields and inside joints, and a one-piece, double-shell stator protect windings, punchings and rotating parts from moisture or corrosive elements. Long, close-running shaft fits, supplemented by a rotating seal, keep dirt from entering the motor along the shaft. Punchings and windings within the inner shell of the motor are cooled by a non-sparring external fan which is protected by a cast-iron housing with a screened air-intake opening.

Low starting current, with balanced design, makes the new Tri-Clad suitable for full-voltage starting, thus permitting the use of simple, inexpensive control equipment. The motor has high pull-up torque for snappy acceleration, and high maximum running torque to meet temporary abnormal peaks and low-voltage conditions.

Lubricator for Air Tools

Specially designed for automatic lubrication of a wide variety of pneumatic equipment, the CCA Lube is announced by CCA Products Engineering, P. O. Box 671, Glendale, Calif.

Features include a full view, nonbreakable transparent plastic window with "O" rings for top and bottom seals. Quantity of oil in the lubricator is visible at all times. Regulation of lubricant is accomplished by a needle valve located on the air outlet side. This "Lube-Mist" regulator is easily adjustable to meet varying equipment requirements. The filler cap and adjusting aperture is located directly above the regulator valve. Since the Lube works only when air-operated equipment is in use, the device is fully automatic, permitting only the correct amount of oil to mix with working air.



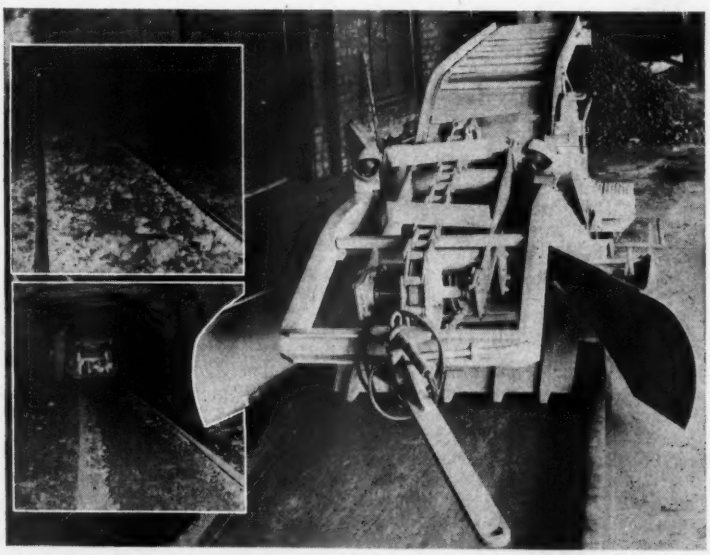
Small size, compact design, simplicity and rugged construction make for easy installation close to working equipment, trouble-free operation and long life.

New Track Cleaner Has Interesting Features

A new track cleaner claimed to remove dirt between rails, irrespective of hardness to a distance of 34 in. from the center of the track, and to load a ton of dirt per minute under proper loading conditions, was recently announced by the American Mine Door Company, Canton, Ohio.

Locomotive propelled, the cleaner is 20½ ft. long and weighs 4,340 pounds. The accompanying illustration shows the machine in operating position, and a portion of track before and after cleaning.

Complete information will be furnished upon request to the company.



McNally Expands Facilities

Thos. McNally, president of McNally Pittsburg Manufacturing Corporation, Pittsburg, Kans., announces the purchase of a majority interest in the Morrow Manufacturing Co. of Wellston, Ohio, effective May 1, 1946. Both companies are large factors in the manufacture and erection of equipment for the preparation and handling of coal as it comes from the mine.

The Morrow Company will continue to operate under its own name as a division of the McNally Pittsburg Manufacturing Corp., Frank C. Morrow continuing as president and Ford R. Morrow as vice president and general manager. Of the parent company officers who will maintain headquarters at Pittsburg, Kans., Edward McNally becomes a chairman of the board; Homer W. Riley, senior vice president, and A. L. Tanner, secretary-treasurer.

The Morrow Co. headquarters and sales office at Wellston, Ohio, will continue to operate but be augmented by the parent company's sales offices in Pittsburgh, Pa., and Chicago, Ill.

Buckeye Clipper Shovel Now Available With 22-ft. "High Lift" Boom

The Buckeye Traction Ditcher Co., Findley, Ohio, has just announced that their Model 70 Clipper ¾-yd. power shovel will be available with 22-ft. long boom and 17-ft. 4-in. dipper stick. The boom is 4 ft. longer than the conventional model and the dipper stick is 3 ft. longer. This *"High Lift"* Clipper provides deeper digging, higher dumping, and a greater digging radius which makes it ideal for clay winning, coal and other stripping jobs, gravel pit work, deep excavation work, high stock piling and borrow pile operations. The extra reach of the *"High Lift"* Clipper means more yards per shift through fewer moves.

The long crawlers and wide crawler treads provide sure footing and coupled with correct balance, the long boom and dipper stick can be used to full advantage without sacrificing stability. Like other models of the Buckeye Clipper, the *"High Lift"* model has vacuum power control of all operations.

Announcements

Continued growth of **Denver Equipment Company** has necessitated the addition of a new vice presidency to which T. S. Bailey, Jr., has been elected. This work involves expansion programs of both the Denver Equipment Company and foreign manufacturing subsidiaries operating in Canada, Africa, Europe, Latin America and the Far East. Mr. Bailey has been associated with Denver Equipment Company 14 years and was sales manager prior to his new appointment.

T. S. Bailey, Jr.

* * *

Wheat Lamp Sales, Inc., announce that, as of May 1, they will expand their operations to include the states of Illinois and Indiana. They will also cover the western part of the state of Kentucky in addition to the eastern part where they now have sales and service representation.

* * *

The Electric Storage Battery Company, Philadelphia, announces the appointment of John W. Weigt as manager of its New York Branch, which is located at 23-31 West 43rd Street, New York, N. Y. Mr. Weigt succeeds D. P. Orcutt, who retires after 36 years' service with the company.

* * *

Announcement is made by **John A. Roebling's Sons Company, Trenton, N. J.,** that Ferdinand W. Roebling 3rd has been appointed vice president in charge of engineering. He succeeds Charles M. Jones, who has become vice president in charge of public and industrial relations. Both men are on the company's board of directors.

F. W. Roebling

Mr. Roebling's appointment provides an interesting sidelight in that he is the third great grandson of the company's founder, John A. Roebling, now actively engaged in management, the others being Charles R. Tyson, president, and Joseph M. Roebling, chairman of the board of directors.

Chas. M. Jones

CATALOGS AND BULLETINS

COAL CONVEYORS. *The Jeffrey Manufacturing Company, Columbus 16, Ohio.* Catalog No. 740 is a complete booklet on conveyor coal mining equipment. The bulletin is 67 pages in length and describes not only conveyors but also loaders, cutters, drills and blowers. The catalog also has a brief descriptive portion devoted to methods of conveyor mining starting on page 59, and various diagrams show the application of equipment underground.

TROLLEY EQUIPMENT. *Ohio Brass Company, Mansfield, Ohio.* Bulletin No. 12 for April, entitled "Haulage Ways," shows a comprehensive line of overhead trolley equipment for electric locomotives. This 8-page bulletin covers mine hangers for trolley wire, trolley wire splicers, trolley frogs, feeder clamps, trolley shoes, and cable taps. The first two pages show color coding of external motor and starting terminals with diagrams as evolved by the American Mining Congress.

SHORTWALL CUTTERS. *Goodman Manufacturing Company, Chicago 9, Ill.* Bulletin No. CM-453 lists various types of shortwall cutters for thick and thin seam mining. The bulletin is 11 pages in length and has photographs of the various machines operating underground as well as accompanying explanatory description.

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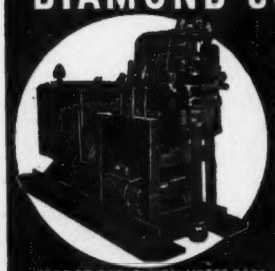

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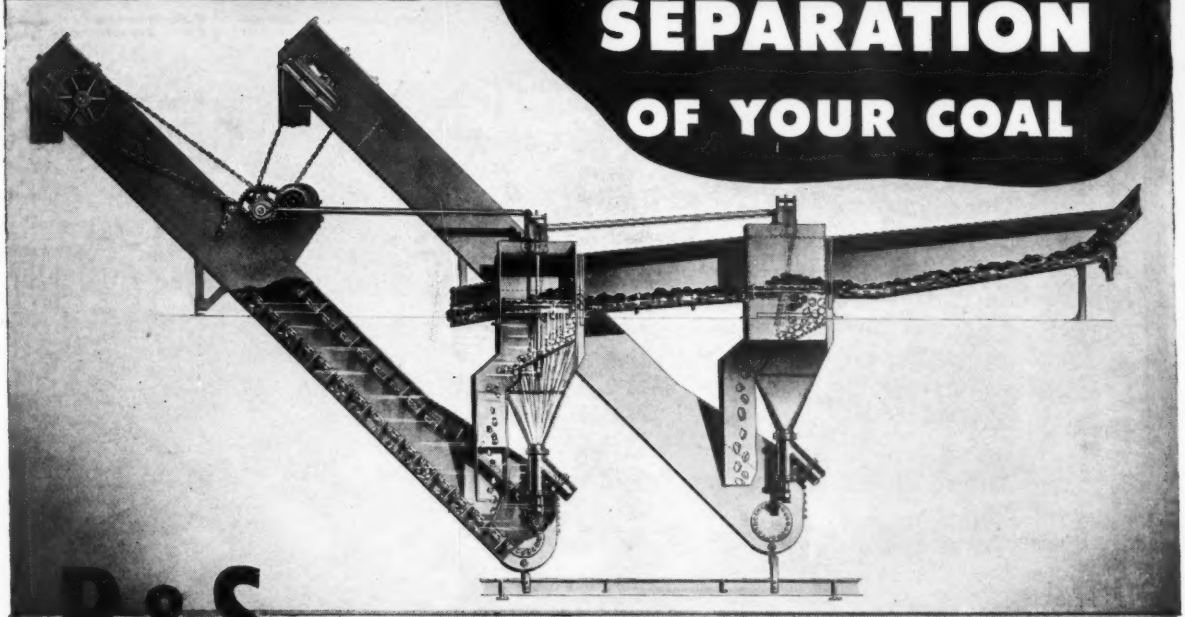

R&S TANDEM HYDRO-SEPARATOR

Windsor Power House Coal Co., Wellsburg, West Virginia, prepares coal for power plant use with R & S Hydro-Separators, pictured above. Mine run coal is crushed and screened. Large sizes are washed in Hydro-Separators. Small sizes are bypassed. Larger sizes are recrushed and mixed with the smaller sizes for delivery to power plant. The capacity of the Windsor plant is 450 tons of coal per hour.

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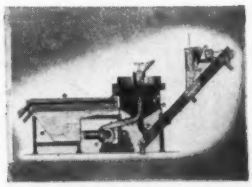

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